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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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THE EMMA MINE, UTAH.

THE emphatic protest of Prof. W. P. BLAKE against his name being used in any way as indorsing the claims made for the EMMA Mine, is certainly satisfactory as establishing the fact that the vendors were aware, at the time of the sale, that there was, at least, some question of the value and permanence of the deposit. There could be no possible excuse for their using Professor BLAKE's report in the manner they did. It is unfortunate, however, that Professor BLAKE did not, at the time, publish in the London and American journals the protest he sent to London ; as it was, the public generally was not benefited by it, though it certainly increased the responsibility of the vendors. We gladly give place to the following letter :

SIR—By your assumption (March 18th) that I have not protested against the sale of the Emma Mine for $5,000,000, you unintentionally, I believe, do me a great injustice. First, because it is not correct ; second, it implies that I was a party to the transaction, which is not so ; third, because, as is well known, my professional opinion has, from the first, been unequivocally adverse to the value of the mine, and my name was used by the vendors without my knowledge or consent. It was a misrepresentation, at which I was openly indignant, and my protest was sent to England. My objections went back of the price—they were against the mine itself. This being the case, I have not felt it my duty to discuss the price, though in common with all miners and mining engineers of my acquaintance, it has always been a matter of astonishment and unfavorable comment and condemnation. Having always and freely characterized the whole transaction as it deserves, I hope that you will give this, my additional protest, as prominent a place in your columns as that occupied by your animadversion. Please add the following from the Report, published in London, of the chairman and solicitor of the company, after their visit of inspection to the mine in 1874 :

" Professor BLAKE has unhesitatingly condemned, in the strongest language, the deception practised upon him and the British public, by the use made of letters dated the 26th and 27th of July, 1871, addressed by him to Mr. PARK and General BAXTER, after an inspection of the mine on their behalf. A misleading paragraph, which applied to the past, and not the future of the mine, was extracted from his letter of the 26th July, and inserted in the prospectus, while the opinion given as to the proximate exhaustion of the mine was carefully suppressed."

Please add, also, that I *protest most strongly* against the recent use in London, by ALBERT GRANT, of the same misleading paragraph, or of my name in any way, in support of the statement that the mine is yet valuable.

Respectfully yours, W. P. BLAKE.

MILL ROCK, NEW HAVEN, March 21, 1876.

Our Utah Correspondent, "S. C.," confirms the report of the finding of ore in the "Bay City" tunnel, either on the Emma Company's ground, or in close proximity to it. Should this deposit prove to be extensive, it will, doubtless, induce the Emma stockholders to raise money for the proper exploration of the property, as they should have done long ago ; and it will, certainly, be matter for congratulation should this notorious property eventually become valuable. Of course, the present or any subsequent find in no way affects the fact of the over-valuation of the mine when sold in London, nor will it justify the highly favorable reports then made.

PHOSPHOR BRONZE WIRE ROPES.

THE uses of this peculiar alloy appear to be extending rapidly in Europe, while in this country it is almost unknown. Its great strength and resistance to oxidation make it peculiarly well adapted, so far as these qualities are concerned, to many of our present applications of iron and steel.

Some practical difficulties have been met with in the working, rolling, and drawing of this new metal—for so it may be called. They consist, principally, we believe, in the inability to obtain a perfect uniformity in the metal, and also to anneal it uniformly. That these difficulties are disappearing as greater familiarity increases our knowledge of the properties of the metal would appear, from a recent report of the Phosphor Bronze Company of London. It is there stated that phosphor bronze pit-ropes are now in use in Germany and Belgium, several of the highest mining authorities having recommended them on account of the great strength of the metal and its non-liability to rust. When the difficulties in the way of rolling and drawing the metal properly have been overcome, a large trade in phosphor bronze tubes, pit-ropes, wire and sheets is anticipated.

It may be of interest to know that "there is money in it," the Phosphor Bronze Company having earned a net profit of 12¼ per cent. during the past year. If this can be done in the experimental age of this interesting alloy, and at a time when few old and well established industries can do more than "make both ends meet," the subject is one worthy the attention of our wire and rope manufacturers.

THE GAS QUESTION.

THE wide-spread disaffection against the Gas-light Companies, aided by the low price of kerosene, has assumed such serious proportions that we hear from all directions of concessions in price. In this and adjoining cities a reduction of twenty-five cents per one thousand feet has been granted; a saving to the consumer of about nine per cent. Possibly if this had been done prior to the popular clamor, it would have received more credit, but since it is the result of compulsion the questions naturally arise, will this reduction satisfy consumers, and should it not be larger ? The companies protest that it is all they can afford to yield. Let us see.

The following list of dividends of our New York and vicinity Gas Companies shows that notwithstanding the reduced consumption occasioned by the economical tendency of the hard times and the introduction of oil their profits were very large, and when we consider that their construction account, which is large, is almost universally paid out of profits, and a large reserve fund is constantly increased before the distribution of dividends, the profits, for hard times like these, seem enormous.

Mutual, New York	10 per cent.	Brooklyn, Brooklyn	20 per cent.
New York, "	20 "	People's "	7 "
Metropolitan, "	10 "	Metropolitan, "	7 "
Harlem, "	8 "	Citizen's, "	12 "
Manhattan "	35 "	Williamsburg "	15 (?) "
Nassau, Brooklyn	8 "		

All cash dividends.

The effect of these large dividends is seen in the market price of the stocks, which, till recently, was in many cases three times the par value.

The liberality claimed in making a concession of even nine per cent. in the price of gas, is scarcely substantiated when the subject is closely examined. Last year the price of coal to our New York companies was reduced one dollar a ton ; this year their purchases have been made at a further reduction of from fifty to seventy-five cents per ton, making a total reduction of from $1.50 to $1.75 per ton (from $7.50 to, say, $5.88). Allowing a make of 9,000 cubic feet of gas to the ton, this corresponds to a reduction, in this item alone, of, say, 18 cents per 1,000 feet. At the same time wages, and nearly every other item of cost has declined largely, making a total reduction in cost of considerably over 25 cents per 1,000 feet, the amount which, in their generous liberality, the gas companies have reluctantly conceded to their dear "patrons," protesting, at the same time, that a further reduction would be ruinous to them.

The companies are actually making more money, on a given production, today, with this reduction in price than they were two years ago, when their dividends and stock showed their profits to be enormous ; yet the President of the Gas-light Association tells us that their business is one of "truth and conscience." Verily, the conscience must be as attenuated as the gas they furnish.

The high price of gas is maintained, 1st, because of an unwillingness to part with an exorbitant profit and a supposed ability to compel it ; and 2d, because the business is in the management, largely, of men who, through personal interests or ignorance, or both, have been averse to introducing into it the scientific investigation and progressive development to which it should be peculiarly open, and the tendency of which, in all other industries, has been to cheapen and improve products.

There are honorable exceptions to this second class, so far as individual engineers are concerned, but they are few, and their personal influence is not sufficient to overcome the unhealthy conservatism of the men they try to serve.

Some other companies attempt to show progressive tendencies by retaining reputable chemists, but as the talents of these gentlemen are confined to the simple routine of photometric tests, and the study of what density will pay the companies best. Investigation being restricted to the one inevitable, old-fashioned system, their employment does not mend matters, but is rather a constant reflection upon the fitness of the engineer in charge, who should properly be an expert himself and thoroughly competent to test results. But how can it be expected that subordinates will be intelligent or ambitious, when those who are in authority over them are indifferent to any improvement, and discourage every effort that aims at cheapening the cost of gas by the adoption of any process of manufacture differing from the antiquated one used by our fathers half a century ago.

We do not propose to make ourselves the advocates of any particular system or process of gas-making ; but it is no secret that gas of a quality much superior to that furnished by our companies, is now being made in many places, and, it is claimed, at a cost greatly inferior to that of gas made in the ordinary way. The figures on which some of these claims are made have been published in these columns, and are of easy verification. Yet, what have our great gas monopolies done towards the investigation of these claims, and towards introducing such improvements as may lessen the cost of gas, both to them and con-

sumers? We have knowledge of the fact, that a party of responsible gentlemen having made expert and practical examination of the residual, or waste product, of one of our large New York gasworks, offered, on being assigned the limited space of fifty feet square, on the company's very ample premises, to erect, without expense to the gas company, and without interference with its regular business, an apparatus which should return to the company, from this waste product, a value estimated at over $600 a day—nothing to be paid by the company until the success of the undertaking should be fully demonstrated, and then but a moderate and reasonable proportion of the saving effected. The process was in successful operation elsewhere; it was no untried experiment, and its claims were, and are, of ready verification. Yet this proposition was not entertained by "the most progressive of our New York gas companies." This corporation now, naturally, joins the others in declaring that any further reduction in the price of gas cannot be thought of.

This is but a sample of the manner in which the cost and selling price of gas is maintained, and it shows how little can be expected from the progressive instincts of those who control this enormous business. This giant monopoly is not, however, beyond the influence of the most insignificant of its patrons, and the substitution of oil for gas, which improved lamps and low prices have greatly stimulated, will, undoubtedly, oblige the gas companies to move forward, with the rest of the world, in seeking real economy through scientific investigation, and the employment of engineers thoroughly qualified by scientific and practical education, to manage their works. Till this is more generally the rule, we despair of seeing that progress made in the art of gas-making which, in reducing its cost, will, in a much greater ratio, increase its application to the varied uses of industry and civilization.

PURE MATHEMATICS.

SINCE mathematicians are proverbially diffident and modest, we can scarcely be surprised that the great mind of W. T. MAQUORN RANKINE should have sought for some natural, delicate, and unembarrassing manner of expressing those sentiments which even book-worms must occasionally feel. How admirably he succeeded, let the following lines from his "*Songs and Fables*," witness.

"THE MATHEMATICAN IN LOVE."

VI.

"Let x denote beauty, y manners well-bred,
z fortune (this last is essential),
Let L stand for love," our philosopher said.
Then L is a function of x y and z,
Of the kind that is known as potential.

VII.

"Now integrate L with respect to $d\,t$,
(t standing for time and persuasion);
Then, between proper limits 'tis easy to see
The definite integral *marriage* must be
(A very concise demonstration)."

Equation referred to in Stanza VI.:

$$L=\phi(x\,y\,z)=\iiint \frac{f(x\,y\,z)}{\sqrt{(\varepsilon-x)^2+(\eta-y)^2+(\zeta-z)^2}}\,d\varepsilon\,d\eta\,d\zeta.$$

Equation referred to in Stanza VII.:

$$\int_{-\infty}^{+\infty} L\,dt=M.$$

We have great pleasure in communicating this exquisite formula, to our mathematical readers of both genders. What a world of embarrassment it will save, to put the language of the "o'er flowing heart" in such expressive, delicate, and withal mathematically exact language.

What would we not have given, to have known it when—when—well, on a certain memorable occasion, the very recollection of which still seems to produce a sensible (?) contraction around that center of pressure from which our *vis viva* proceeds.

How simple, to merely hand the object of our adoration this neat formula, saying, "Let us integrate between the limits of plus and minus infinity." Then there is no knowing how nearly a careful mathematical investigation might determine the relative values of x, y, and z, in the function L.

There is something fascinating about this view of the calculus that we do not recollect having noticed, when applying it to the coarser and more useful—no, not that exactly—but let us say more prosaic, calculations of abstract numbers. Who would not study the Calculus just for the sake of making the above integration.

RECENT DEVELOPMENTS IN EMMA HILL, UTAH.

Special Correspondence of the Engineering and Mining Journal.

TO THE EDITOR: SIR—Ore shipments for the past fortnight have averaged about the same as during the previous part of the Winter. Prices rule as usual, supply and demand remaining the same. In the early part of the month the Waterman Smelter Company was shut down for the Winter. By the middle of April the new hoisting works at the Hidden Treasure Mine, belonging to the Waterman Company, will be completed. With the aid of these it is expected that the output of the mine can be doubled, that is from 70 to 80 tons can be shipped daily. In consequence of this increase they will run two shaft furnaces this season.

The smelting works of J. C. PASCOE, lying just north of this city, but within the city limits, have been closed by the municipal authorities. Owing to the small capacity of the works, their closing will not affect the market.

Little Cottonwood furnishes two items of interest. I have it, on reliable authority, that ore has been struck in the "Bay City" tunnel. Accurate surveys have not yet been made of the position of this ore body, consequently it is not known definitely if the ore is in Emma or North Star ground. As these two mines are immediately adjoining, it makes but little difference in which the ore is found, since, in any case, it proves that the mines are not merely superficial, but have a future.

Probably this evidence of the inaccuracy of Mr. ATWOOD's report will stimulate the stockholders of the E. S. M. Company, to do something toward the intelligent development of their mine. Unless the majority of those familiar with the mines of Emma Hill are mistaken in their opinion of the veins there, the prosecution of a mining enterprise would prove much more remunerative than a suit for the recovery of money invested. It seems as if it would be better for the Emma stockholders to learn first if they have been swindled in this transaction by their own officers, before commencing action against the vendors.

About four years ago a company, known as the Howland Tunnel Company, commenced work in Little Cottonwood. They started a tunnel in the cañon about three-fourths of a mile below Alta, with the object of cutting Emma Hill longitudinally on a course about northeast or southwest, and thus intersect the veins of the hill at right angles, striking them at a depth of about 2,000 feet. The total length of the tunnel will be 6,000 feet. In the first one hundred feet a small vein of ore was crossed. This has been but little developed, since the ores require concentrating before being marketable. About 570 feet in the ground looked favorable for finding ore. A drift was started, which in a few feet ran into ore. The drift has now passed through twelve feet of ore without finding the hanging wall. This ore will also require concentration before being marketable.

The samples which I have seen, show galena with a little pyrites in a quartz gangue. This strike has a general interest, in so far as it proves the presence of a second large vein of ore traversing the hill, running nearly parallel with the Emma-Flagstaff vein, and entirely independent of it. Physically, it is entirely different, the ores resembling more those of Bingham. Samples of the ore as mined assayed from 13 to 22 per cent. lead, and from 25 to upward of 100 ounces of silver.

The Richmond vs. Theresa mining suit, of which I made mention in my last, has been decided in favor of the Richmond, on all points. A suit for foreclosure of mortgage brought by the creditors of the Sheridan Hill Mining Company, comes on in a fortnight. This involves the ownership of the Neptune and Kempton Mine in Bingham, and the Sheridan Hill Smelting Works on the Jordan.

S. C.

SALT LAKE CITY, March 18, 1876.

NOTES.

CLEARFIELD COAL ITEMS.—The *Industrial World* (Osceola, Pa.), March 17th, gives the following notes about the Clearfield coal mines. On the whole, business is dull. Franklin mines that were running day and night for the past month, are working one-third time. At Sterling, times are very dull, which is something strange, but at present they are depending on the daily mails for work, having no standing orders. WHITEHEAD'S Mine is running steady every day, but so crowded with men that very little comes to the share of each. They average from $1.25 to $1.50 per day. FISHER'S Mine is also running regularly, but crowded with men. The Webster colliery is not doing much at present, but is expected to start up in a few days. The slope is running to its full extent this past week, and I am informed they have received another large order of some twenty or twenty-five cars per day. Eureka Mine is doing pretty well of late. They work from four to five days per week.

REPORT OF THE CONSOLIDATION COAL COMPANY FOR THE YEAR ENDING DEC. 31, 1875.—The annual report shows the following:

The gross receipts from mines, railroads, rents, etc. (including value of coal on hand), were	$2,648,178 36
Total expenses of every kind (exclusive of interest and sinking fund), but including steel rails and other permanent improvements	1,876,402 07
Net earnings for year 1875, exclusive of interest and sinking fund	$771,776 29
The interest on the funded debt for the year was	$192,410 52
Sinking fund (retiring $78,000 of mortgage bonds)	70,985 00
Total interest and sinking fund for year 1875	$263,395 52
Net earnings for year 1875	$508.380 77
Semi-annual dividend, paid Sept. 15, 1875	256,250 00
Surplus of year's earnings after payment of all expenses, interest, sinking fund and dividend	$252,130 77

FUNDED DEBT.

The total mortgage debt of the company was, on the first day of January, 1875		$3,159,100
Reduced by sinking fund in the year	$78,000	
And still further reduced by taking up and cancelling the remaining outstanding bonds of the Georges Creek Coal and Iron Company	98,600	
		176,600
Total funded debt, Jan. 1, 1876		$2,982,500

The sum of $98,600 paid to the Georges Creek Coal and Iron Company was the last instalment due that company under the agreement made in 1863 for the purchase of their railroad between Frostburg and Piedmont, now constituting part of the Cumberland and Pennsylvania Railroad. This payment has been made out of the surplus and working capital of the company.

To secure its liquidation at or before maturity, $100,000 in the six per cent. first mortgage bonds of the Cumberland & Pennsylvania Railroad were deposited with Messrs. LIVERMORE and MOTT, the trustees of said mortgage. These bonds have been delivered to the Treasurer of this company, and may be either sold or temporarily hypothecated, should additional working capital be required.

MINING AND TRANSPORTATION.

Mined and delivered from the Consolidation Companies' mines:

	Tons.
In the year 1874	467,451
In the year 1875	448,923
Decrease	18,528

The year 1875 has been one of almost unexampled depression in manufacturing and commercial interests. The Cumberland coal-field has suffered under the general stagnation to the extent of 56,000 tons reduction for the year, and the Consolidation Coal Co., has borne its full proportion (19,000 tons) of this decrease; notwithstanding which, the net profits of this company, as above reported, have increased—its debt has been reduced, and the scale of dividends advanced.

THE CLAUSTHAL WORKS.—No. 3.

(*Continued from Page 248.*)

THE COARSE SEPARATION HOUSE.

THE ore under 1·26 in. is next transported for separation to the coarse separation house, which is represented in longitudinal section and plan by Figs. 4 and 5, and in cross section by Fig. 6. The riddles are driven by a turbine *a* (Figs. 5 and 6) laid down close to the back wall, and driven by a head of 18 ft. From the vertical axis of this turbine the power is transmitted by a pair of bevel wheels to the cross driving shaft *b c* of the building, and thence by means of the four small counter-shafts *d d*, *e e* to the riddle themselves. The arrangement of the pulleys and straps is clearly shown in Fig. 4, as is also that of the water pipes, by means of which the water necessary for the riddles is conducted from the supply pipe *f* (see Fig. 6) of the turbine. The smaller pipes, which conduct the water from the chief water mains to the separate riddles, are omitted in this as in the other engravings to avoid unnecessary complication. The ore to be passed through the riddles is brought along the rails *g h*, Figs. 4 and 6, and tipped into the hopper, *i*, from which it is gradually fed (in the same manner as in the sorting of the smalls in the crushing house) by means of an iron roller *h* (which is set in slow

Fig. 4.

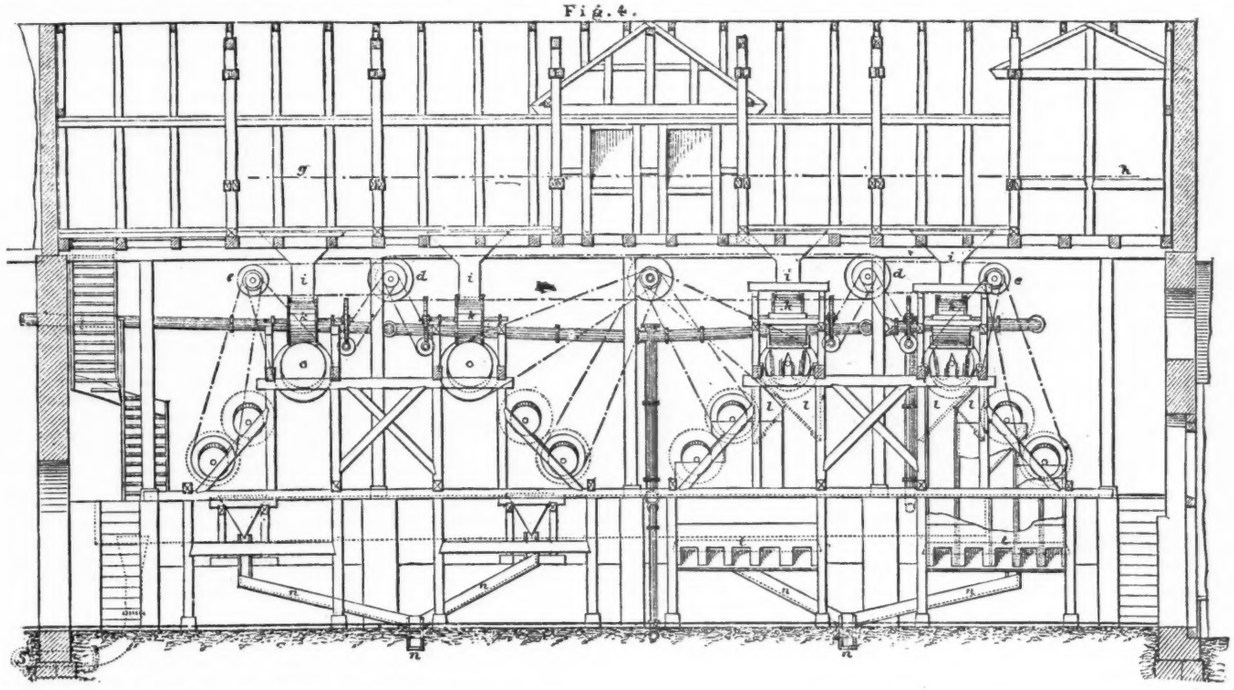
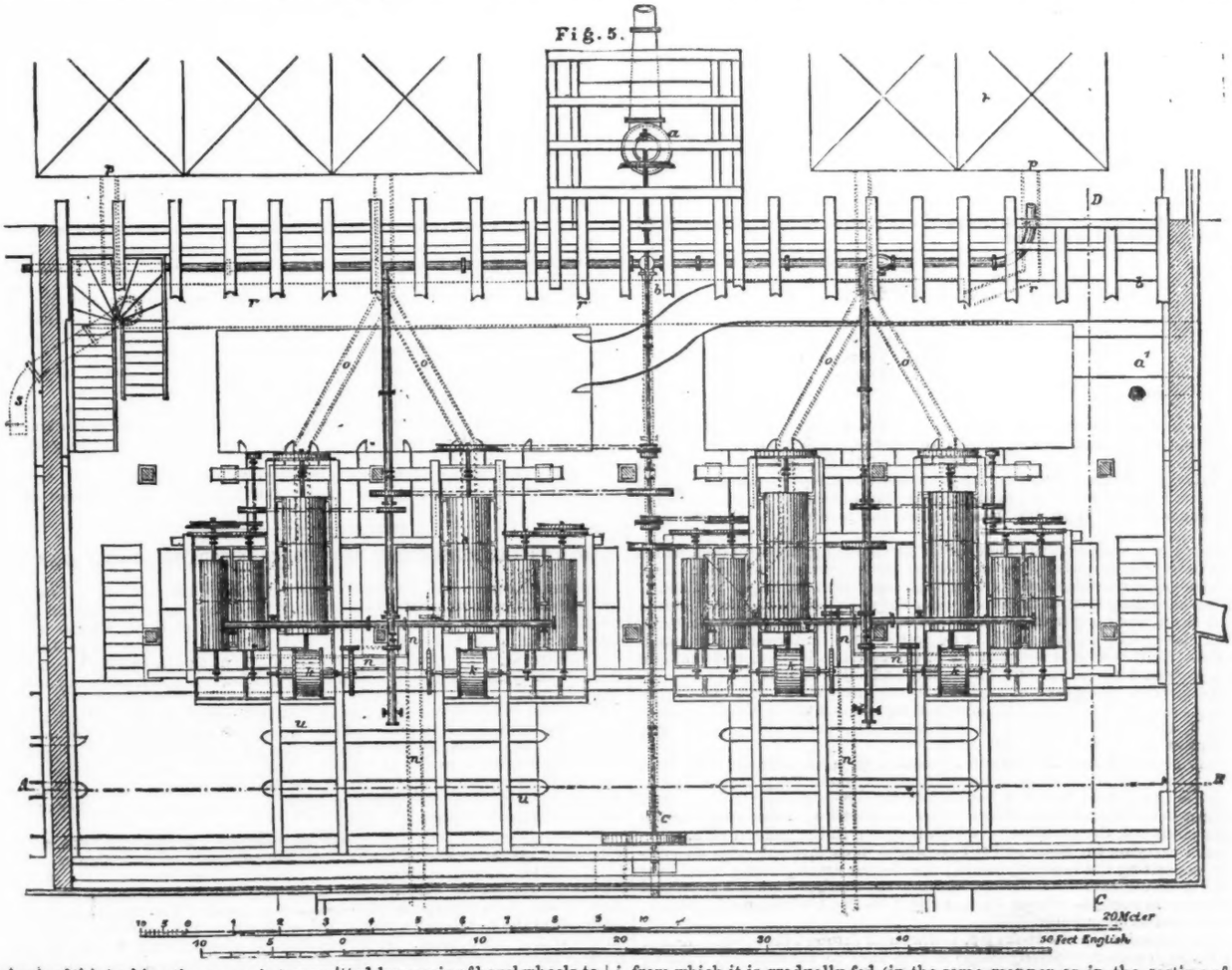
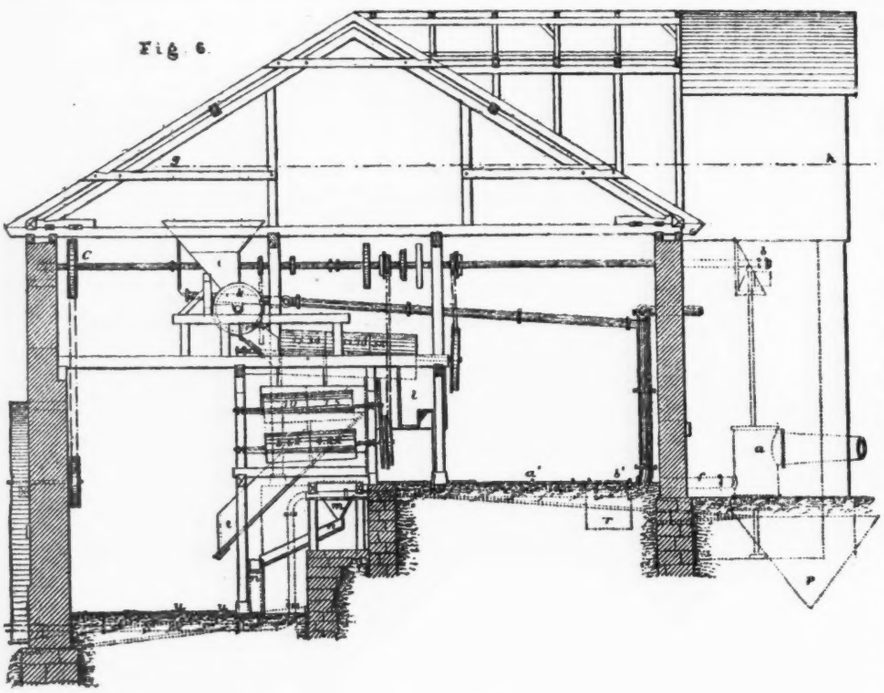


Fig. 5.





COARSE SEPARATION HOUSE.

rotation by an endless screw and worm wheel), and drops into an underlying inclined sheet-iron channel, along which it slides to the upper riddle.

As is at once to be seen from Figs. 4, 5, and 6, the coarse separation machinery consists of four similar apparatus, each consisting of three riddles. The riddles (similar to those in the crushing house) are constructed with cast-iron spokes and perforated sheet-iron plates. The riddles have a cylindrical form, so that the axes are inclined, and have here as in all the separation riddles an inclination of 1 in 24. In each apparatus the upper riddle has a length of 9 ft., and a diameter of 3 ft., whilst the two lower riddles are each 6 ft. long and 2 ft. in diameter.

The upper riddle has three equal divisions (*i. e.* each 3 feet long), with different-sized holes, namely, 1·26 in., 0·7 in. and 0·526 in. in diameter, whilst the two other riddles have only two such divisions, the upper one with holes of 0·39 in. and 0·295 in. diameter, the lower with holes of 0·22 in. and 0·166 in. in diameter respectively.

Corresponding to these different sizes of the riddle holes, we obtain the following seven different sizes of ore :

1. Above 1·26		picked.
2. Between 1·26	and 0·7	
3. " 0·7	" 0·526	Sent to coarse jigging machines.
4. " 0·526	" 0·39	
5. " 0·39	" 0·295	
6. " 0·295	" 0·22	
7. " 0·22	" 0·166	

The sizes 1 and 2 are destined to be again picked. They are collected in the receivers *l l'* (Figs. 5 and 6), which are on the upper floor of the separation building, and from which they are allowed to fall into the wagons by simply raising the cast-iron sliding doors attached to the perpendicular side of the receivers ; from thence they are transported in the wagons to the adjoining picking house marked 3 in the general plan, and to which we shall later on refer.

The sizes 3 to 7 constitute the material for the coarse jigging machines, which we must provisionally pass by to consider the portion under 0·166 in. in diameter, which of course also falls out in this separation in larger or smaller quantities, according to circumstances. For the reception of the finer portion there is a sheet zinc hopper under each separating apparatus, this hopper being indicated in Fig. 6 by *m*, and in Fig. 5 by dotted lines under each of the middle riddles. By this hopper a separation of the particles between 0·166 in. and 0.039 in. in diameter from the still finer slime and silt is effected.

The first portion (composed of particles between 0·166 in. and 0·039 in. in diameter) is drawn off through the spout of the hopper along the channel *n*, Figs. 4 to 6, which leads to the fine separation house, which latter lies directly to the front of the coarse separation house.

The finer portion (slime and silt) on the contrary, passes over with the water through a gap in the upper edge of the zinc hopper, along the gutters *o*, Fig. 5, of which each two unite into one, before leaving the building. By means of these channels the water is led into two systems of settling tanks, each consisting of six tanks *p p*, the situation of which is shown in the general plan.

The water carrying the slime and silt circulates in each of the six tanks successively, depositing the heavier portion ; the cleared water passing back along the gutter *q*, Fig. 6, into the building, and into the sunken tank *r*, Figs. 5 and 6, and thence through the pipe *s*, Figs. 4 and 5, to the lower-lying buildings, where it is used as clear water.

The slime deposited in the tanks *p p*, is drawn off through the spout beneath, and led through cast-iron piping single dotted line) to the auxiliary washing house marked 10, to be there further dressed by jigging and buddling.—*Engineering.*

THE WORTHINGTON COMPOUND DUPLEX PRESSURE PUMP AT THE BESSEMER WORKS OF THE ALBANY AND RENSSELAER IRON AND STEEL COMPANY, TROY, NEW YORK.*

By Robert W. Hunt.

THE first pump of this character, made by H. R. WORTHINGTON, and, so far as the writer is informed, the first and only one of its kind ever constructed, is now in daily use in the above-named works.

The water pressure necessary for the working of the hydraulic machinery of this plant had been supplied, up to the time of the building of this pump, by two Worthington Duplex High-Pressure Pumps, having steam cylinders of 20 in. diameter and 12 in. stroke, with water plungers of 7½ in. diameter ; eight inlet and eight outlet valves of 2½ in. diameter, and pumping into a 6 in. pipe.

These pumps required a large amount of steam, and, through the various additions to their duty, their capacity became far short of the work required.

In preference to putting in another engine of the same class, it was decided to accept Mr. WORTHINGTON'S proposition to build the compound one under description. He guaranteeing that it should be equal to the demands of the works, and at the same time cause a saving of from 5 to 6 tons of coal per day, from the amount required to run the two old pumps.

The new engine has been in operation about one month, and so far has exceeded the most sanguine expectations. It consists of two high pressure cylinders of 21 in. and two low pressure ones of 36⅜ in. diameters, by 36 in. stroke, with water plungers of 9½ in. diameter. There are two air pumps of 20 in. diameter by 18 in. stroke ; the condenser being 24 in. diameter by 60 in. high.

The low pressure cylinders are jacketted with live steam, and the high pressure ones with wood and felt. The high and low pressure steam cylinders are in line and immediately adjoining each other, while the inconveniences attending an internal stuffing box, are avoided by having two piston-rods for each of the low pressure cylinders, running through stuffing boxes on the outside of the smaller high pressure ones. The steam valves are very ingeniously designed balanced slide ones ; and by a clever arrangement, the necessary oil for lubricating the various inclosed parts, is forced through pipes by a small hand pump, placed on the platform directly under the throttle-valve.

The water valves are arranged in eight separate nests—four in the inlet and the same number for the outlet. Each nest containing seven valves of 2½ in. diameter. The inlet and outlet pipes are both of 6 in. diameter. The pump is required to supply, at a pressure of from 370 to 400 lb., one 13 in. and four 12 in. hydraulic cranes, each having a lift of ten feet, and a ladle crane of 15 in.×6 ft. 6 in. lift ; three 7 in.×5 ft., and one 7 in.×7 ft. cylinders on pulley cranes ; two 12 in.×2 ft. 4 in. rams under the converters ; a 6 in.×8 ft. cylinder attached to a rack rotating the screws which set the middle roll of the blooming train ; also a 9 in.×6 ft. cylinder which raises the tables of the same train, and a 5 in.×6 ft. cylinder moving the pusher attachment to the tables ; and two 9 in.×16 ft. cylinders working the stock lifts for the cupolas of the converting works, and one 6 in.×7 ft. for that of the foundry. All of these being in constant use day and night.

The pump meets this duty in the most satisfactory manner, and it has not been found necessary, at any time, to open the throttle valve beyond ¼ of a turn. The steam pressure usually carried is from 50 to 60 pounds, but as an experiment all this work has been done with only 20 pounds.

While I am not prepared to give the actual saving of fuel, I am well convinced that it is beyond Mr. WORTHINGTON'S guarantee.

The machine is necessarily somewhat complicated, but as its speed has never exceeded 25 double strokes per minute, and that speed for only a fractional part of a minute, it does not seem probable that it will be liable to get out of order.

The two old pumps have been permitted to remain as a reserve, in case of accident, and in consideration of past services performed to the best of their ability.

NOTE ON THE PRESENCE OF PHOSPHORUS IN SODA ASH, FLUOR SPAR, AND CRYOLITE.

TO THE EDITOR : Sir—I recently had occasion to use soda ash and fluor spar as fluxes in a case where it was peculiarly important that they should contain no phosphorus. They were sold by a large dealer in these articles as free from this impurity to the best of his knowledge and belief. The fluor spar had been analyzed, indeed, and no phosphorus had been reported. On repeating the analyses, however, both were found to contain notable amounts of phosphorus.

It will be remembered that the first analysis of fluor spar, which approximated to a correct result, was made by KLAPROTH, who discovered no phosphorus. BERZELIUS made an accurate analysis afterwards, and found 0.5 per cent. of calcic phosphate in the Derbyshire spar. I have not been able to find a critical examination of American fluors, but probably a small percentage of phosphoric acid would be found in all of them, together with other constituents in minute quantities.

With cryolite, the case was somewhat different. No analysis which I have consulted intimates the probability of the presence of phosphorus. So entirely was the suspicion absent, that a preliminary examination for it seemed like an uncalled-for expenditure of labor. But certain anomalous results compelling me to analyze it, phosphorus was found. The examination was not made upon the powdered mineral, but upon fragments carefully picked out of an apparently pure mass. It is possible, of course, that minute portions of fluorite should occur as inclusions in a mass of cryolite and escape detection,

* A paper read before the American Institute of Mining Engineers, at the Washington meeting, February, 1876.

but there was no visible indication in the present instance that such was the case.

This adds another to the list of the mineral combinations of the haloid with the formerly so-called oxygen salts. It is most striking in the combination of calcic fluoride with small amounts of calcic phosphate, and, as in apatite, of calcic phosphate with calcic fluoride and chloride, but many other phosphates, silicates, etc., exhibit the same grouping, and if further extended the examination would probably much extend the list, to which cryolite is now added. The last analysis of cryolite, quoted in *Rammelsberg's Mineralchemie*, was made when the mineral was a cabinet curiosity ; now that thousands of tons are consumed annually a new determination is needed. ALBERT R. LEEDS.

STEVENS INSTITUTE, Hoboken, N. J.

THE CEDAR POINT IRON COMPANY'S FURNACE, NO. 1, AT PORT HENRY, ESSEX COUNTY, N. Y.*

By T. F. Witherbee.

IT is proposed to give, *first* a description of the works ; *second*, a report of the first six months of the present blast ; and *third*, such improvements as have been suggested by the practical working.

The site selected for this furnace was, at the time of commencing work, Oct., 1872, entirely covered by the navigable waters of Lake Champlain. A coffer-dam was first built of cribs of round timber filled with stone, forming three sides, while the shore answered for the fourth. Considerable excavating was done with a steam dredge, a hole being left for it to pass out. The opening was then built up, and the cribbing banked up with blue clay from the bottom of the lake, to render it water-tight, and the dam pumped out ; the remainder of the excavating being done by hand. All of the foundations, with the exception of the elevator-tower, and fifteen feet of the east side of hot-blast, rest on the Potsdam sandstone, which forms the shore line, dipping into the lake at an angle of fifteen degrees.

Owing to jogs in the formation, a much greater depth was found than was at first anticipated, the foundation under the stack being 35 feet square at bottom, by 30 at top, and 40 feet high of solid cement stone masonry, with 5 feet of fine brick on top of that—making total height of 45 feet.

The hot-blast foundation is 55 feet square by 35 feet high, of dry masonry, with the exception of 7 feet of the top, laid in cement, and containing the hot-blast gas and chimney flues.

The engine and boiler foundations are not so high, being nearer the shore. Altogether, nearly 40,000 perches of stone masonry were required in foundations.

The stack is 70 feet high by 27 feet diameter at mantles, tapering from that point to 7 feet 3 inches from tunnel head, where it is 22½ feet diameter, flaring from thence to top, to same diameter as at mantles. The boiler-plate shell rests on heavy cast iron mantles, which are in turn supported by six cast iron columns.

The weight of cast iron in foundation is as follows: 6 base plates, 12 tons; 6 columns, 18 tons ; 6 caps, 9 tons ; 6 mantles, 36 tons. Total, 75 tons.

Thickness of shell: first course, ¼ in., the remainder, 5-16 in. The stack, as at present lined up is 16 feet bosh ; 13½ feet under bell at top ; crucible, 5½ feet diameter, by 7 feet high, at commencement of bosh, encased with galvanized wrought iron water-boxes, up to within 12 inches of tuyere arches, and 1 foot below bottom of hearth ; angle of bosh, 71 degrees ; closed hearth, with the LURMAN cinder block in two places, taking cinders out on the east side.

Cubic contents of stack as follows :

Shaft, 6,509 cubic feet ; bosh, 1,764 ; crucible, 166 ; total, 8,439.

Tunnel head is closed by an ordinary bell and hopper, handled by a pneumatic cylinder. Diameter of bell 7½ feet.

The casting house is of brick, 112 feet long by 60 feet wide by 20 feet high at the eaves, covered with a galvanized corrugated iron roof. It extends past the stack to the first two stoves, which form the south end of it, leaving a space available for pig beds of only 60 by 60 feet—too short by 30 feet at least. The gases are conveyed down by a fire-brick lined wrought iron flue 6 feet 3 inches in diameter, from which branches 4 feet in diameter lead to the boilers and hot blast stoves. Each branch has a butterfly valve to shut off or regulate the flow of gas. As a precaution against explosions, the flues have four 30 in. safety valves and one safety cover, 38 in. square, besides boiler doors and explosion valves on the stoves.

The boiler house is of brick, 66 feet long by 72 feet wide, with iron roof, and contains boiler capacity sufficient for two furnaces, consisting of eight boilers, each 55 feet long and 5 feet in diameter. Connected together two and two by transverse mud drums 10½ feet long by 5 feet diameter, and also by steam drums 9 feet long by 4 feet diameter.

Iron in shells ⅝ in. thick, and in heads ½ in., of Bay State C. No. 1. Each set has grate surface 5 feet by 11 feet for direct firing ; two, four, six, or eight can be used, as required. By a system of air-passages in the walls, the gas is supplied with highly heated air for combustion.

A large brick flue runs across the west end of boilers, connecting them to a wrought iron fire-brick lined chimney 115 feet high by 8 feet 7 in. at bottom, and 6 feet at top. The draft of each set is controlled by a butterfly damper. Each steam drum has one 6 in. Richardson safety valve, set to blow off at 60 pounds.

A long copper "goose neck" pipe connects each drum to an 18 in. wrought iron steam pipe, 105 feet long, which conveys the steam to the blowing engine and pumps.

The blowing engine is a side lever condensing one, built by HENRY G. MORRIS, Philadelphia, Pa., and is of the following dimensions : Steam cylinder, 60 in. diameter; blast cylinder, 100 in. diameter, each 8 feet stroke; capacity of blast cylinder, 872 cubic feet per revolution. Two fly-wheels weigh 23 tons each. Two side levers 11 tons each. Two cross-heads 2¼ tons each, of Bessemer steel. Diameter of main shaft and beam center 18 in. By means of an adjustable cut-off, steam can be made to follow to ⅞, or cut off at ¼ stroke.

The condenser draws its water from a well in the basement of engine-room, which is supplied from the lake. The engine-house is of brick, 66 feet long by 60 feet wide by 32 feet high at the eaves, and is covered by a slate roof, on top of which is a cupola for the admission of air to the engine.

The engine-house is calculated for two engines ; the place intended for the second one is now used as a machine-shop. The pumps are in the basement of engine-room, and draw water from the lake through a 16 in. cast iron pipe, and also through a timber sluiceway, 24 in. square, in which the 16 in. pipe is laid. Two direct-acting KNOWLES' pumps supply the tuyeres and hot-blast stoves with water. Steam cylinders 24 in., and water cylinders 16 in. diameter by 24 in. stroke ; capacity of water cylinders, 20 gallons per stroke. The water is delivered direct to stoves and tuyeres by a 4 in. pipe, and also to a wrought iron tank in the boiler-house, 51 feet 9 in. long by 8 feet diameter, with a stand-pipe 7 feet diameter by 24 feet 6 in. high, the whole holding about 25,000 gallons.

From this tank, water is also conveyed to stoves and tuyeres by a 4 in. pipe, connecting, finally, with the one mentioned as leading directly from the pumps, making a complete circuit.

All of the pipes run uncovered in the open air, and are kept from freezing by pumping water from the hot-well, when required. The speed of the pumps is controlled by a FITTS' governor-valve, worked by a tank and float placed on the second floor of the engine-room, and at same height as overflow in main tank. Should the water fall below a certain point, an alarm whistle would be blown, and call the attention of the engineer to the fact.

One of the pumps exhausts into the condenser of the blowing-engine, while the other has a CRAIG & BREVOORT condenser. Both can be run non-condensing, if required. The two feed-pumps are also in the basement, and consist of one letter A, and one 10 by 6 by 18 in. Mining KNOWLES' pumps. Water is taken from the hot-well, and also from main water pipe and tank.

An important improvement, suggested by Mr. GEO. H. REYNOLDS, of New York, is applied in connection with the introduction of the feed-water. As originally planned, it entered the side of the mud-drum, and rose through the connecting nozzle up into the boiler, spreading over the bottom on account of its greater specific gravity. The improvement consists of putting into the nozzle a light sheet iron pipe, to carry the water up to the bottom of the lower gauge-cock, thus securing the advantages of top feed.

The TAWS & HARTMAN Pneumatic Elevator was built by the Delamater Iron Works, New York. Cylinder 36 in. diameter by 74 feet 2 in. stroke, working a 4 barrow platform—two going up on either side of the cylinder at once. The usual safety devices are applied—four ¾-in. steel wire ropes connect the piston to the platform. The elevator also works a car on an inclined plane, to bring up the coal and flux from the wharf to the level of the scale house.

Blast for operating the hoist is usually taken from the main engine, but can be supplied by a KNOWLES Direct-acting Blowing Engine, with 14 in. steam and 30 in. air cylinder by 36 in. stroke. This engine was put in principally to furnish *cold*, and consequently, *dry* air, in extremely cold weather, and thus prevent the hoist from freezing up.

Four WHITWELL fire-brick stoves heat the blast ; each stove is 29½ feet high by 22 feet in diameter, with about 11,000 sq. ft. of heating surface. About 525 tons of fire bricks were used in lining each stove, besides fire clay mortar and packing (blast furnace cinder crushed up).

The blast is carried from the stoves to the furnace by a wrought iron pipe 46 in. in diameter and 5-16 in. thick, lined with 14 in. of fire brick. This pipe connects to a continuous bustle wind pipe, inside the columns, 30 in. diameter of wrought iron 5-16 in. thick and lined with 9 in. of fire brick. A wrought iron chimney 115 ft. high, lined with bricks, serves for the four stoves.

Connection is made with the Lake Champlain and Moriah Railroad, and also indirectly with the New York and Canada Railroad by 1,200 feet of trestle, built through the lake most of the way, and about 26 feet above the water. The Lake Champlain and Moriah Railroad delivers the ore and most of the flux used at the scale-house doors, direct from the mines and quarries. The coal, so far, has been delivered by canal boats on the wharf, but can be received directly from the Delaware and Hudson Canal Company, via the New York and Canada Railroad, whose track runs within 50 feet of the works, on the west side. The latter road has freighted most of the iron so far. The dock on which coal is stored has a frontage of nearly 500 feet, which will be rapidly extended by the enormous quantity of cinder made.

The stock used at this furnace is as follows : viz. Spring Mountain and Philadelphia and Reading anthracite coal, containing about 86 per cent. of carbon.

Flux.—White crystalline limestone and magnesian limestone.

Ore.—WITHERBEES, SHERMAN & Co's new bed magnetic. Samples of the materials and products are here shown. The ore is known as *pure* and *lean*. The *pure* contains by analysis, from samples weighing 1½ tons :

Metallic iron	68·24
Oxygen with the iron	26·01
Insoluble silica matter	4·32
Water	·38
Sulphur	none.
Phosphorus	·038
Lime	·14
Magnesia	none.
Alumina	·28
Loss and undetermined	·592
	100·000

The lean ore is a *mechanical* mixture of *nearly* pure *magnetic oxide* and *pure quartz*—the variation from a *pure* oxide being made up by a silicate of lime and magnesia.

It will thus be seen that a rough test for quartz can be made by taking the specific gravity of samples and making the necessary calculations. The specific gravity of the ore is 5·158, and of the quartz 2·5785, the ore being almost exactly twice as heavy as the quartz. When a complete chemical analysis cannot be conveniently made, the above method is found useful, as a guide to fluxing.

The ore is used in about the following proportions : one-quarter pure and three-quarters lean, which latter quantity is again divided into *chunk* and *fine*, by dropping it from the cars into screens. The fine, as regards yield of metal, is intermediate between the chunk and pure, and amounts to about one-quarter of the total amount of ore used. All of the coal is used excepting chestnut and smaller sizes, the large lumps being broken. The chunk ore is broken into pieces equal to 4 in. cubes, and flux into 6 in. The pure ore is mostly fine, that portion which is in lumps is broken more or less, according to its liability to crumble.

The behavior of Champlain ores in the blast furnace is somewhat peculiar. When fluxed with limestone alone, it is impossible to run on *soft* iron continuously, it being necessary to occasionally run off into *hard*, and clear out the crucible, the cinder also becoming sticky. With a mixture of common and magnesian limestone in proper proportions, No. 1 and No. 2 iron can be made as long as desired.

The explanation seems to be this : the magnesian cinder being more refractory, of course requires a higher temperature for its fusion, which happens to be the proper temperature for the production of soft iron, and if it *has* a sticky point, it is at a much higher heat than is often attained in the blast furnace.

Mr. GEORGE W. JAMME, Superintendent of the Crown Point Iron Company,

* A paper read before the American Institute of Mining Engineers, at the Washington meeting, February, 1876.

was the first to use magnesian stone with that object in view, in the Champlain region. Varying amounts of the two fluxes have been used, equal parts of each give the best results; their analysis is as follows, viz.:

	Common Limestone.	Magnesian Stone.
Lime	53·50	37·96
Magnesia	·51	12·32
Carbonic acid	42·50	43·39
Insoluble matter	2·43	2·84
Oxide, iron and alumina	·52	2·54
Water	·17	·38
Phosphorus	·001	·001
Undetermined and loss	·369	·569
	100·000	100·000

An attempt is made to form such a cinder as will contain 5 parts base to 4 acid, calculated according to the method proposed by Mr. KENNETH ROBERTSON. After making the proper allowance for the self-fluxing properties of the ores, fuel, and fluxes, the charge requires, of equal parts of the above limestones, the following percentages:

New Bed, Pure	8 per cent.	New Bed, Fine	32·4 per cent.
" Chunk	60 "	Anthracite coal	3 "

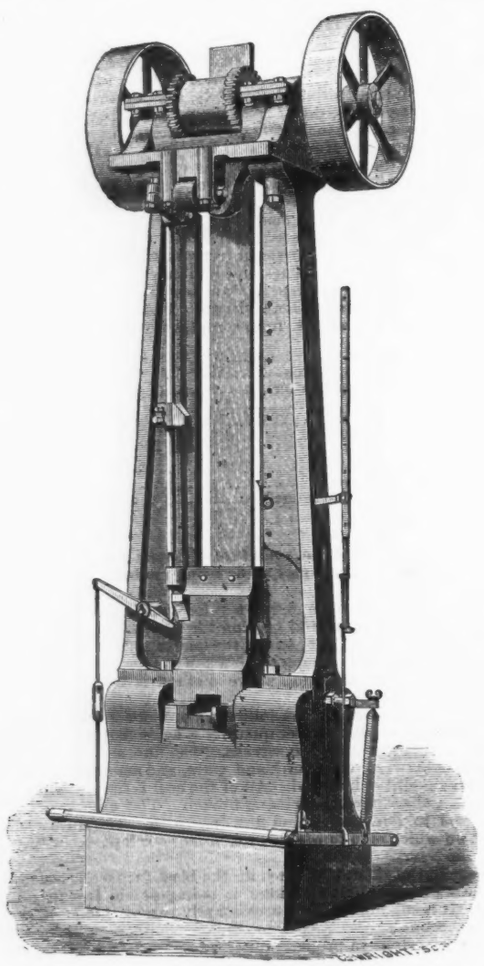
Cinder taken in equal amounts from eighty-four consecutive tappings, analyzed as below:

Silica	47·94	Sulphide of calcium	1·75
Lime	31·20	Phosphoric acid	·014 P.·006
Magnesia	4·36	Undetermined and loss	·986
Alumina	12·01		100·000
Protoxide iron	1·55		
" manganese	·19		

TO BE CONTINUED.

IMPROVED DROP-HAMMER.

THE accompanying cut illustrates PRATT'S improved Drop-hammer, as made under the GOULDING & CHENEY patent, by the PRATT & WHITNEY Co., Hartford, Conn. It has stood the test of a very large practice successfully, and is represented as a convenient substitute for the trip-hammer, and also an efficient drop-hammer. The hammer is raised by means of a flat-surfaced strip of tough wood, which engages with the faces of finished cast-iron rolls, driven by gears at both ends. One of these rolls runs in fixed bearings, and the other has its bearings in a yoke suspended on journals, which allows it to be moved toward its fellow, to engage with the surface of the lifting-board. This yoke has a central portion projecting downward and engaging by a connecting-bar with an eccentric, or cam, operated by a vertical starting-bar through the medium of a



PATENT IMPROVED DROP-HAMMER.

crank-lever. By this combination, a much greater force is instantaneously exerted, in placing and retaining the roll in contact with the lifting-board, than is possible when the starting-bar is connected directly with the roll bearings. The two rolls, with their four gears, and the cam movement, are all parts of the head-piece, and may be removed as one piece, or the rolls may be removed separately. An automatic and adjustable stop holds the hammer suspended at any height desired. An automatic trip may be attached, which secures a series of blows of equal force, at the will of the operator, while in the foot motion the force of the blow is under the perfect control of the operator, who can instantly change it from the full impact of the weight falling from the extreme height of the lift, to a simple pressure of the weight of the mass, without motion. This absolute control and instant adjustment of the force of the blow will be appreciated by all practical forgers. The workman has the free use of his hands in operating the machine, as its action is governed entirely by the foot.

For getting a uniform result, as in striking up work, without rebound or diminishing the effect of the blow, the automatic trip is desirable, producing an effect otherwise unobtainable, except by long practice. With each machine is furnished a wrought-iron die-bed, to save the trouble and expense of dressing the main bed, in case of damage, by chisel and file or planer, and suitable wrenches.

The following are some of standard sizes of these useful hammers:

Standard Sizes of Hammer.	Extreme Fall.	Between Uprights.		Total Weight.	Speed of Rolls per Minute.
		Narrowest	Just ab've bed		
250 lb.	4 feet 8 inch.	8¾ inch.	11¼ inch.	5,000 pounds.	120
600 lb.	6 feet.	12 inch.	15 inch.	10,000 pounds.	100
1,200 lb.	6 feet 6 inch.	15 inch.	18⅛ inch.	22,000 pounds.	80

MINERAL PRODUCTION OF NEW MEXICO.

WE take from a letter by Mr. F. M. F. CAZIN in the *Mining Review*, the following notes of the mining region, situated west of the Spanish Range, and east of the Rio Grande, and called the New Placer Mountains, the Sandia and Manzena.

"The placer diggings, although rich in gold, are almost valueless for want of water; the veins carrying some gold and some argentiferous galena, are not developed enough to permit of an estimation of their value. The latter bear evidences in their character, that in depth they will lose their galena and become copper-bearing. Copper is the metal *par excellence* for which this district will become celebrated eventually.

"In the New Placer Mountains, where, by doleritic anamesit eruptions all the rocks from the Permian to the Lower Silurian have been brought to the surface, in a place where the Lower Silurian lime-rock is overlaid by a quartzosemetamorphic rock, and almost in immediate contact with the dolerite, there is a vein of copper ore twenty-five feet wide; and so wonderful is the accumulation of the different minerals of copper, that nearly all recognized can be found in or on the vein. For the thickness of several feet there is a loose mass of clay, in which the tesseral crystals of cuprite are found; there are large sheets of chalcopyrite in perfectly transparent quartz; of melaronite and bornite, as well as of the magnificently blue-colored chrysocolla and covelline; and above all, malachite in chunks that would make the Emperor of Russia a chamber set equal to anything produced from the Ural copper mines. The vein carries, besides a good percentage of copper, some eight ounces of silver and one-half ounce of gold to the ton. The owners had the ore assayed in Colorado and no traces of gold were found; but in a horseshoe gulch through which the vein passes—yet where its outcrop was invisible, except on the side-bluffs—there are more than 500 shallow placer shafts, on a gold bonanza, carrying coarse gold. I saw nuggets weighing more than an ounce taken from the placer, which could only originate, of course, from this gigantic vein. Subsequently new assays were made from other parts of the vein, and the presence of gold proven.

"The vein is thoroughly opened in two places—half a mile distant, one from the other. Its dip is about 10°. Lignite and water are at about the equal distance of six miles from the mine. Timber covers the mountains in abundance, and extends down some distance on the mesas. Refractory material for furnaces is so frequent that no trouble will occur on this score. At some little distance are salt and hyperoxide of manganese deposits, and it is only necessary, to make the situation complete, to have some carboys of sulphuric acid turn up, when all supplies would be provided for the extraction of copper, silver, and gold in the cheapest way, as there is for precipitation, nearly as much old machinery iron in Northern New Mexico as in Colorado."

The Editor of the *Mining Review* adds: "From late reports from the vicinity of the copper mines, we have concluded that the metallic product of New Mexico, including gold, silver, and copper, for the year 1875, was not less than $600,000."

NEWBURYPORT, MASSACHUSETTS, MINES.

Special Correspondence of the Engineering and Mining Journal.

TO THE EDITOR: SIR—In answer to the oft-repeated inquiries which I have met of late, of "Is there really anything in the Massachusetts mines?" "Has the Newburyport bonanza 'gone up?'" and others, of the same general tenor, permit me to give, through your columns, such facts as can be arrived at, at this stage of development, and such matters of interest as may develope in the course of operations.

South-westerly from the old city of Newburyport, commencing say a mile from the city, proper, and extending some 8 miles, stretches a low, uneven, rocky tract known as the "Highfields." This tract in no case rises over 50 feet about the level of high tide, and is interspersed with swamps, a part of the less rocky portion being covered with oak forest, and many of the 'hills' covered with red cedars.

From this tract, during the summer, a pasturage was obtained for a considerable number of cattle; although, in some places, the region was so rocky as to give some color to the statement that the noses of the cattle had to be filed, to allow of their grazing between the rocks. Ten dollars an acre was deemed a good rate for this land.

For some twenty years, rumors and reports of occasional masses of "mineral" (galena?) being found in these pastures, would come to notice, but nothing ever came of it. Most of the specimens found were either lost, forgotten, or thrown away, and the opinion became settled that, if any "mineral" really existed there, *it would have been found by Prof. Hitchcock, in his Geologic Survey of Massachusetts.*

Some five years since, Mr. ALBERT F. ADAMS, an intelligent farmer of the Highfield district, found some of this "mineral" in a small pasture, and pro-

ceeded to take up, in a quiet way, the study of mineralogy, wherein he soon arrived at a knowledge of the nature of the ore found, and that more might be expected near the same locality.

Continuing his researches, and finding more of the surface ore, he finally purchased the pasture, and in due time made his discoveries public. Certain parties made arrangements of bonding the property, and late in the Autumn of 1874, after several months' prospecting, struck the ore "in place," 3 feet 7 inches thick (argentiferous galena), about 9 feet below the grass roots. This was the first discovery of the "Chipman Lode."

Before this lode was discovered "in place," parties had commenced, in a quiet manner, a thorough geological reconnaissance of the Highfield district. The fact was very soon established that the region which might be expected to contain gold and silver ores, was not less than 20 miles from north to south, and extended possibly 15 miles inland.

Then arose the first excitement, and acted like a sort of moral "electric shock" to the old sleepy conservatism of Essex County. At once the usual crowd flocked to the district, the class of "miners" who know less about mining than a monkey is said to know about music, being largely represented.

The *Chipman* and *Boynton* Mines have been lately consolidated, under the name of the *Merrimac Silver Mining Co.* They intend soon to increase their operations, and are erecting ore-dressing works. They, at present, employ about 60 men. Depth of principal shaft 180 feet. Number of shafts, two. Drifts and levels at 30 feet, 100, and 150 feet, besides cross-cuts. Vein dips, southerly, about 15° from perpendicular. The production of this mine has been good from the start.

Next in order, as regards amount of work done, is the "Four Rock" Mine. This is situated nearly two miles south-easterly from the "Merrimac" on an entirely separate range of veins. No 1 shaft is down 56 feet, with drifts on veins 10 and 11, running 48 feet east and 38 feet west. The amount of ore and pay rock taken out, to March 1st, was 300 tons. Width of veins 10 and 11 in east drift, average 20 inches. In west drift other veins join, making a thickness of over six feet. General dip of veins, southerly, about 50° from horizontal. Tunnel 20 feet, south, from main shaft, cuts veins 8 and 9. No. 9 is one foot thick. Company just arranging for a central shaft, and also for ore-dressing works of large capacity.

The ores of both the Merrimac and Four Rock Mines, though differing in general characteristics, are, in the main, a mixture of galena with gray and yellow copper, with occasional streaks of brittle silver.

The *Beelzebub* Mine, at the location formerly known as the "Devil's Basin," is well advanced. Here the ore is a disseminated sulphide of silver, the rock running about 20 to 30 ounces per ton.

The *Kent's Island* Mine is a prospecting shaft on the porphyritic belt at southern portion of the district. The ore is gray and yellow copper, disseminated apparently in a mixed shaley limestone, near the porphyry (probably metamorphosed to some extent).

The *Flood's Lane* Mine has just suspended operations for a short time. The ore here is also a disseminated brittle silver ore.

These three mines are held by Messrs. WILLIAMS & LOWRY, and their associates, and this company are about putting up concentrating works.

The *Cedar* Mine is an immense development of low grade ore, and is quite a curiosity in itself. Principal prospecting shaft now down 30 feet. Ore galena, also, gives some $10, gold, per ton, possibly, in form of associated sulphurets, finely disseminated.

The *Gilberg Mining Co.* is just starting up a main shaft, on a very good piece of property; is well equipped with machinery, etc., and likely to give a good account in future.

The *Noyes* Mine is down 40 feet, on a 15-inch vein of mixed ores. About 50 tons of good paying ore have thus far been taken out.

This is "just a beginning," and I hope, in a week or so, to be able to give you an account of some of the other mining properties of this district, together with some idea of the ores, etc. 922.

NEWBURYPORT, Mass., March 20, 1876.

CARIBOU, COLORADO, MINING NOTES.

Special Correspondence of the Engineering and Mining Journal.

IN my last letter I stated that from the summit of the Caribou Hill we could, from an inspection of the surrounding shaft-houses, trace out the three systems of veins which are proven. The first found and most important of these groups of veins comprises those running east and west; the second those bearing northeast and southwest; these are crossing veins and they fault, more or less, the lodes of the first group. The third system of veins run north northeast and south southwest. From the fact that these carry vein matter similar to that of the first group, it has been suggested that they are but spurs or branches from them; and the fact that these north northeast and south southwest veins run into the east and west veins, but have not yet been found crossing them, lends probability to the suggestion.

The vein matter of the northeast and southwest lodes is, in general, of a bright red color, owing to the presence of oxide of iron; it contains also a good deal of calc spar, never found in the east and west veins, where the gangue is quartzose. The ores are bisulphurets of silver, silver-glance, stephanite, argentiferous galena, and copper pyrites. The decomposition of the sulphurets of silver coats the quartz principally in geodes with native silver, in the form of small leaves and wires.

The vein matter in these lodes is both hard to drill and hard to blast; the country rock is a hard, fine-grained granite, containing much quartz, is hard and tough, and as the veins are rarely more than two feet in width, mining here is quite expensive. The miners express this in saying that when they are working in an east and west vein, then the cost of their powder and hercules powder is much more than their candles, while the opposite is the case in working the crossing veins. For example, the sinking of the Caribou shaft (14 ft.×5 ft.) is generally contracted for at $60 to $65 per running foot.

The principal east and west veins on the northern slope of the Caribou Hill, beginning at the base of the hill, are the Staten Island, Grand Republic, Poorman, Sherman, Five-Thirty, Seven-Thirty, Caribou, Topsill, and the Ontario, all at distances of 30 to 50 feet one from the other. Higher up the hill and on its southern slope are prominent the Mount Vernon, Wabash, Greasing Pan, Grand Viser, and many others. Of all these veins but three are worked the year round, namely the Poorman, the Sherman and the Caribou.

THE POORMAN MINE.

The first of these is the easiest worked, and so far as developed, the richest vein on the hill; it is about one-quarter of a mile from the town of Caribou, but this distance up the rough hillside, honeycombed with prospectors' pits, and in the face of drifting snow, appears many miles before we arrive at the shaft-house, where a horse-gin hoists the ore from the mine. We descend by a steep ladderway (all the east and west veins here dip steeply to the north). In the first level, at the depth of 85 ft., the vein had a width of 2 ft. 5 in., and a pay streak 9 in. wide producing first and second class ores, yielding, generally, 200 and 100 oz. in silver. This level is in about 65 ft., and the pay streak in the face is over a foot in width. In the 105 ft. level the vein attains, in places, three feet in width, and the pay streak from 6 to 18 in. The vein, which in sinking, was found in some places only one to two feet in width, at the bottom of the shaft, 208 ft., attains the level of the Caribou tunnel, which is now in about 900 ft. and 100 ft. beyond the Caribou vein. The Poorman lode to the west of the shaft is crossed by another, probably the Oriental vein, which has been found very rich near the intersection where worked by the Tunnel Co. The Poorman vein, near the intersection is very lean.

An estimate of the ore yield, etc., based on the ground broken out at the time of my last visit, showed that in the shaft, 8,405 cubic feet were broken at an average cost of 80 cents per cubic foot, including hoisting, handling, and sorting the rock. In the drifts 7,349 cubic feet were broken, at an average cost of 45 cents per cubic foot. From the time the shaft was down 70 feet, up to the close of last year, the mine sent to Golden smelting works 16 tons or ore, of an aggregate assay value of $3,555 coin. To the Boston and Colorado Works, 15½ tons of the value of $4,597, and to the Caribou Mill, in Nederland, 120¾ tons, value $13,355. An examination of the dump, 800 tons, showed that one-third of the pile is ore of an average value of $30 to $40 per ton. From these figures we deduce that the Poorman Vein has an average assay value of nearly $500 per square fathom. The cost of exploitation, everything included, was less than $150 per fathom. The reduction works paid, as an average, 65 per cent. of the assay value of the ore, or say $320 per square fathom, more than double the cost of mining.

These east and west veins of Caribou Hill must be classed as true fissure veins. The Sherman Vein, which is only 30 feet from the Poorman, has very smooth, well-defined walls, and though not so rich as the Poorman (the pay chimneys not following each other as rapidly and the gangue harder) is yet a valuable vein. These ore chimneys are rich streaks of the vein running nearly perpendicularly with a slight inclination towards the east, and widening and narrowing at different depths, but never giving out entirely. V. D.

TREASURE HILL, WHITE PINE DISTRICT, NEVADA.

Special Correspondence of the Engineering and Mining Journal.

THE peculiarity of its climate and mineral constitution is the specific distinction of Treasure Hill. As was observed in a previous communication, its climate had not a single parallel in the United States, so it can now be said, until you pass down to Chili, nothing will compare with it in its mineral organization. Here and there, in Nevada, snatches of the same mineral are exhibited, but, as a whole, it is without a rival, save in Charnacillo. The docility of the chlorides (bromides and iodides inclusive), and the rarity of their occurrence is such, that possibly a glance at their difference from other minerals, would not be ungrateful to even non-professional readers.

Silver, like other metals, unites with chlorine, bromine, iodine, sulphur, oxygen, etc., making a chloride, bromide, iodide, sulphide, and oxide. Its normal condition in the veins is that of a sulphide, from which it is often changed by natural causes, mostly superficial, into that of an oxide or carbonate, and by extraordinary agencies into that of a chloride, or into the metallic state. Sulphur is very tenacious in its grasp, and numberless veins of silver repose in quietude, until extricated for reduction, and when subjected to ordinary process, yield 60 to 70 per cent. So long as sulphur clings to the metal, so long is the metal insensible to the attack of mercury, the agent ordinarily resorted to for its extraction. But often a vein being subjected to atmospheric influences is desulphurized, down to usually slight depth, and the silver ore changed into a chloride, that, when brought to mill, and subjected to the same treatment as above, will give ninety per cent. of its value. A pure chloride will give nearly three-fourths silver. Simple heat will not affect the separation, but the presence of most of the metals will do so under certain conditions—mercury will abstract it.

Iron, copper, zinc, etc., if in contact, will rob the silver of its chlorine, from their superior chemical affinity, and leave the silver to combine with mercury, as a definite amalgam. To obtain an equivalent amount of silver from the sulphide, an additional expense is to be incurred by roasting, to desulphurize, and salting, to chlorinate, at the hazard of loss from volatilization. The superiority of the chloride ores is thus made manifest, and a district, like that of White Pine, that abounds in such ores, deserves greater notice than those in which the refractory ores occur. A zone, four miles long and one-half mile broad, full of veins containing chlorides of silver, will yield in our day, with competent exploration, a sea of silver, and still leave a handsome reserve for a future generation.

In addition to the great veins that nearly coincide with the strike of the mountain (north and south) are veins of later origin and lesser volume, that are transverse to the former, having the relation to them that the ribs have to the backbone of a skeleton. These veins were produced by an east and west upheaval, that made a barrier between the water-sheds of the Humboldt and Colorado, and are numerous and, in general, well mineralized. The celebrated Eberhardt is of this class, as well as several other ones which have been developed, such as the Burning Moscow, Earl, Tom Payne, and Pocotillo. The pro-fecundity of the cañons that separates the three mountains, Treasure Hill, Babylon Hill, and White Pine Mountain, will enable a more assured future to explore their recesses to the depth of from one to three thousand feet at an inconsiderable outlay, inasmuch as by running on a vein, mineral is constantly disinterred, and at no expense for drainage or timbering. Had Mr. WALTON, who levied a tax of a few hundred dollars on the "*Innocents at Home*," accepted this line of operations, his application to Congress for a concession would have been needless and would not have been an abortion, but in lieu of this, he, without survey or a preliminary location, asked for a grant to run a tunnel longitudinal in the mountain (eleven miles), connecting his mineral objects with an air-line railroad that could have no existence in any other than a crack-brained projector. A half-dozen tunnels adhering to the courses of these veins, would not only yield directly, but incidentally, in intercepting the great north and south courses. They would, unquestionably, exhibit vast bonanzas, and when the perforations were complete from side to side, they would allow the mountains to be conveniently disintegrated. A. C.

HAMILTON, Nev.

CONDITION OF MINING INDUSTRY IN UTAH.—NO. 2.

OPHIR DISTRICT includes the three cañons known as Dry, East, and Silverado! Those cañons are merely deep gorges, eroded by the elements, and are cut through the strata in an almost direct east and west course. The sides of the cañons, as in all similar places in the West, are rugged and precipitous, presenting great cliffs, rising to hundreds of feet from the base of the beds of limestone, with little, if any, departure from a vertical front. The western half of the Oquirrh range of mountains appears to have been raised by a line of upheaval, passing along or near the base of the mountains, just to the west of the town of Ophir, and passing to the west of the Chicago Mine in Dry Cañon. This line is marked through from Camp Floyd District, on the south, to the foot of the hills upon the north. Over this line of upheaval the beds have been slowly bent, until now they form an anticlinal fold, one flank of which rests in Rush Valley, and beneath Stockton Lake, and the other under the very center of Mountain range. To the east of this axis of upheaval the rocks have been subsequently fissured, and an immense eruption of porphyry has taken place.

The line of this outburst being to the east of the "Mono," "Hidden Treasure," and "Mountain Lion" Mines, and continuing on through Camp Floyd District, forming there a familiar peak, known as "Granite Point," and used as an United States monument, from which bearings are usually taken, in making surveys for mineral lands. One notable fact connected with this dyke of porphyry is, that all the mineral deposits of the district are found, with but a few unimportant exceptions, upon the west side of the dyke, or in the dyke itself; and in all mines that I have so far examined, the dip of the veins is sharply in the direction of the dyke, and the course, or strike parallel with the dyke. I am impressed with the idea that in the future the great mother vein of those districts will be found either in the mass of the dyke itself, or as a contact between the dyke and the country rock.

The mines are now producing heavily ore of good grade, both in silver and lead, keeping all the smelting works of Rush Valley busy at work.

The *Deserett Mine* has long been known as the richest in quantity of ore, next to the Mono, of all the mines of the district, and has now reached a new body of very high grade ore, the extent of which is not yet known. The *Fourth of July Mine* ships about eight tons daily of galena ore, carrying about 35 ounces of silver to the ton. The *Kearsage* is shipping a good quantity of fair ore, and more than paying its way. The *Hidden Treasure* ships about 30 tons daily; though the capacity of the mine is easily 50 tons. They are hindered at present by want of transportation for their ores, and the double duty of working out ground for their new hoisting machine. The bottom of the works shows a vein of solid galena over twenty-five feet in width; the mine is developed by five shafts, the deepest being at present nearly eleven hundred feet in depth. They own their own reduction works, and keep the smelter busy turning out bullion.

The *Mono Mine*, after over a year of inactivity, has commenced work again, though only so far as to re-timber the shaft, and put the works in shape for the Summer work. The *Rattler, No. 2*, is one of the veins occurring in the porphyry dyke, and shows a good body of galena ore, similar to the Hidden Treasure Mine. The *Chicago* is working a small force on the mine, and extracts some eight tons of ore daily.

The *Thal. Stevens* has recently struck a large body of ore and is preparing to sink a perpendicular shaft, to work the mine through. This is necessary, as the irregular character of the works hitherto, has only been for the purpose of developing the mine. The mine is now developed to a depth of over two hundred feet.

The *Queen of the Hills* works a large force of men and takes out about thirty-five tons of ore daily. This mine was purchased by an English company (the Chicago), and illustrates the fact that Americans can manage mines, even for English companies, and make them pay. Their works are the most complete of any in the district, and reflect great credit upon Mr. GODBE, the present manager.

The *Mono* Company propose to push their new tunnel with Burleigh drills, and develop their mine towards the deep from the tunnel level. This will be the second work driven in Utah, by the aid of Burleigh drills, and will, in all probability, be a success. There are many new mines being developed in the district, and a good many of the old ones producing handsomely, but I will defer notice of them to another time. In general the prospects of the district are excellent, and the cash value of this year's product will not fall much, if any, short of two millions of dollars during the present year.

In my next two letters I shall have something to say about the coal, iron, and copper mines of the Territory. M.

TUSCARAWAS, OHIO, COAL AND BLACK BAND ORE MINING—A SCOTCH-AMERICAN ENTERPRISE.

THE works of the Glasgow and Port Washington Iron & Coal Company are located in Tuscarawas County, Ohio, three miles east of Port Washington and one mile north of the Pan-Handle Railroad, with which they are connected by a private branch railway. The company own about 1,200 acres of land, a good part of which is underlaid with black band ore, and all of it with several beds of coal—one of which, No. 6 of the geological nomenclature, ranges from five to eight feet in thickness. Two blast furnaces (closed at top with bell and hopper), seventy feet high and seventeen feet bosh, are erected; but only one of them is yet in blast. The fuel used in the furnace is mainly Connellsville coal, a little coke, made from coal No. 6, being added. The ore used is roasted black band, with a small per centage of Lake Superior ore in a raw state, to darken and strengthen the iron. The black band is calcined at the mouth of the mine, and (after being calcined) contains, on an average, fifty-one per cent. of iron. At present, the furnace casts three times in the twenty-four hours, averaging fifteen tons per cast, or forty-five tons per day, making a splendid No. 1 foundry iron. The expressed opinion of founders is that the iron made by this company from the black band ore is equal to Eglinton, and superior to Glengarnock, Scotch pig made from the famous Scotch black band.

The black band of this company is of irregular thickness, ranging from five inches to twelve feet, and it is frequently wanting altogether over great areas where it is due. It forms the immediate cover of coal No. 7, a seam of coal from six inches to two-and-a-half feet in thickness at this point, though in many places in the Ohio coalfield it is from four to five-and-a-half feet thick. The ore miners, in recovering the ore, undermine on top of the cone, and leave most of the coal in the mine unwrought, for it is inferior in quality to No. 6. This latter seam is opened and worked to some extent by the company, the coal anging from five to eight feet in height. It is coked in ovens at the pit-mouth, but it is too largely impregnated with sulphur for furnace use. It is a commanding looking seam of coal, black and lustrous, and would bear shipping to the Cleveland and other markets as a house fuel, or for rolling-mill purposes or the generation of steam. The company have in contemplation the erection of washing-machines, to wash and clean the coal for use as furnace fuel, a practice successfully applied at many ironworks in Great Britain and on the Continent of Europe, with coals of a much inferior grade.

Before doing so, however, they will make search by boring for the lower coal of the series No. 1, or the Briar Hill coal, the place of which is about 350 feet below No. 6. A bore-hole has been commenced and is now down 120 feet, but work on it has been stopped until an experienced borer is brought out from Scotland, for the company claim that they were imposed upon, by misrepresentation, in purchasing iron ore property, and have lost faith in the integrity of the "Yankees." As, however, coal No. 1, which, in the Mahoning Valley and in Southern Ohio is an excellent furnace coal, lies in patches, in hollows and swamps, and is of very irregular and limited deposition, one bore-hole may mess it even if it exists in good thickness and quality. An experienced borer from the Mahoning Valley, thoroughly acquainted with all the intricacies of this coal, would be of more service to the company than any Scotchman, however experienced in British boring, and honest ones abound, mauger the suspicion to the contrary.

This company have also an extensive fire-brick work establishment erected, all ready for operation as soon as business revives. The entrance to the mine is within a few feet of the Pan Mill, the fire-clay is of good quality, is from seven to eight feet thick, and is now mined and used in the furnace as it is needed.

About 700 tons of pig iron are on hand in stock at present, which will be kept at the works until the iron business revives. The company is now making iron below the average cost of production, but as it is strong and has plenty of money, it is thought to be not bad policy to lay up a stock, as iron can be made cheaper now than ever it will be again.

All the the various departments are managed with the accustomed Scotch energy, prudence, and economy. The works are superintended by WM. RENNIE, a practical miner, who from the workman's pick has raised himself to the top of his profession. The furnace is managed by JOHN FLEMING, a practical furnaceman, who also has worked his way up from a common laborer. The Financial Secretary, is Mr. COUTS, a practical mining engineer, and the son of a wealthy Scotch iron manufacturer; he too has been trained in the business.

A. R.

HYDRAULIC MINING AND AGRICULTURE IN CALIFORNIA.

THE partial and spasmodic discussion that has occurred this winter on the effects of hydraulic mining upon agriculture has developed the fact that in this issue we possess a "burning question," destined, beyond a doubt, to give rise to the most serious and bitter antagonisms in the near future. Here are two great and important industries, one of which cannot be carried on without involving enormous injury to the other, and eventually to the whole State. But the fact least clearly realized, up to this moment, appears to be the comparatively innocent character of hydraulic mining at present, when contrasted with its assured future. It was only in 1852 that hydraulic mining was invented and its progress for many years was painfully slow. When at length capital became engaged in the work, and joint stock companies were forced to undertake the great engineering feats necessary, and mechanical science came in aid of these enterprises, the business received a great impetus, but even now many of the most important of these undertakings are being only just entered upon, after years of preparation spent in providing the means whereby hundreds of square miles of territory will be washed down. If the plans of the hydraulic engineers throughout the Sierras could be seen, it would be found that present arrangements contemplate the working, within the next five years, of matter sufficient to make whole ranges of hills. The question of the distribution of this enormous mass of soil and detritus is one demanding the most serious attention. The future of the harbor of San Francisco, as well as the future of agriculture in the valleys watered by the rivers which bear the hydraulic tailings is involved; and beyond these weighty considerations is that of the probable alteration of the climate of whole regions by the changes in process. To suppose that issues of this gravity can be disposed of during the confusion and haste of a legislative session, by men ignorant of the bearing of such facts as are before them, is as absurd as to suppose that the matter is one which will bear to be ignored. We do not hesitate to predict that in less than five years this will be the absorbing issue of California, and that everything else will be subordinated to it. When we reflect that there are more millions at stake upon this matter than there are dollars upon any other issue now before the people, and that upon its intelligent solution the inhabitability of the State may ultimately depend, we feel that too much attention cannot be given it. The duty of this Legislature is plain enough. All it can do, and certainly the best it can do, is to appoint a Commission to examine the whole subject and report upon it. If fit men are selected for this duty there is no reason why the next Legislature, or the Congress sitting two years hence, shall not be in a position to settle the question in accordance with science, equity, and regard for all the rights and interests involved; but no other course promises anything but disappointment and failure.—*Sacramento Record-Union.*

THE NEW IDRIA QUICKSILVER MINE SOLD FOR $1,000,000.

SAN FRANCISCO, March 19.—It is stated, on the authority of THOMAS BALL, President of the New Idria Quicksilver Mining Company, that the trustees of the company have ratified the bond for a deed to be executed on the 1st of September next to MONTGOMERY BLAIR in consideration of $1,000,000. $400,000 down and the balance in five years, secured by a mortgage on the mine at 7 per cent. The company protest that this is not a compromise with MCGARRAHAN.

The MCGARRAHAN case is one of those perennial affairs which is breaking out afresh every now and then, like the famous Chorpenning claim. The New Idria Quicksilver Mine, the ownership of which has been so long in dispute, is situated in an indescribably dreary locality, about 200 miles south of Sacramento, Cal. From the mine there slopes easily down to the San Joaquin a vast plain, which is well nigh a desert. On the west, the plain is bounded by a range of low foot-hills, with here and there a miserable dwarfed oak, the surface creased in the manner peculiar to the scenery of that section of California, and the whole plain and its fringe of hills about the color of a withered yellow rose. There hovers over the foot-hills, however, that wonderfully soft, lilac, chiaroscuro haze, which glorifies the distance beyond description. On the desert plain there is a little, fine wiry grass, and on the foot-hills, among the few oaks, now and then a bunch of bright green chamizal, or of yellow-green sage. Even the tops of the Coast Range there are scarcely wooded, producing only sickly pines and straggling live oaks. But the famous mine which has

these dismal surroundings is one of wonderful richness, the bed of quicksilver being, it is said, almost exhaustless. The mine was opened up about fifteen years ago, and was worked successfully for a few years, when operations were stopped by an injunction which continued in force until 1865. Since that date, although the title to the property has continued in dispute, the mine has been actively worked, from 200 to 300 men being constantly employed. The crude ore yields about. 7 per cent. of clear quicksilver, the monthly product of the mine at present being worth about $100,000. The New Idria Mining Company, which is now in possession of the mine, claims ownership by virtue of an alleged purchase from the original settlers of the country in which it is situated. WILLIAM MCGARRAHAN bases his claim to the property upon an alleged purchase of it from the owners under authority of an old Mexican grant and of a patent which he claims was once executed but from which the signature was afterward wrongfully erased. He traces his claim back to a Mexican named VICENTE GOMEZ, who, in February, 1853, presented his claim to a tract of land comprising four square leagues, and known as the Rancho Panoche Grande. His case was carried from court to court until the Supreme Court of the United States finally decided that it had no foundation whatever. MCGARRAHAN, having purchased his alleged interests, obtained a fresh foothold for them through a general act in reference to Mexican land grants passed by Congress in 1866, and ever since then he has been struggling, in Congress and out of it, to obtain legislation which will turn the mine over to him. Certain Congressmen have been very active in the past in furthering his pretensions, but not to any purpose. Finally, the Government of the United States still further complicated the matter by putting in a claim of its own, based on the ground that all the private claims are invalid, and that the General Government had never parted with its own title. Just at the close of the last session of the 43d Congress, in March, 1875, a clause was inserted in the Sundry Civil Appropriation bill, by which the Secretary of the Interior was instructed to report to the present Congress whether the New Idria Company occupies more land than it is entitled to under the mining laws Under this provision the Secretary of the Interior, in May last, appointed a Commissioner to make the required investigation, and he has since been employed at this task, but without having as yet reported upon it. It is claimed by MCGARRAHAN that the New Idria Company has, since it has been in possession of the mine, taken from it quicksilver to the value of $7,000,000. The sale of the company's claim to ex-Postmaster-General MONTGOMERY BLAIR for $1,000,000, shows that the property is a very valuable one, and there is little cause for wonder at the struggle for its possession.—*Philadelphia Evening Telegraph.*

ERRORS IN LEVELING.

AT a recent meeting of the Institution of Civil Engineers, held in London, Mr. G. R. STEPHENSON, President, in the chair, the paper read was "On the Probable Errors of Leveling, with Rules for the Treatment of Accumulated Errors," by Mr. WILFRID AIRY, B. A. It was stated, with respect to genuine errors of observations, that in most engineering works it was unnecessary to give much attention to the small discrepancies between the results arrived at by different observers; but, in the case of a complicated system of long lines of leveling, the aggregation of small errors became formidable, and the proper treatment of them required considerable method and skill. Errors of leveling were of three kinds:—(1) Mistakes; (2) Instrumental errors; (3) Errors of observation. (1) Mistakes arose from want of care in reading the staff or the bubble, or in booking the readings, as well as from the foot of the staff being shifted between the readings, and from want of care in holding the staff vertical. The only effectual safeguard was to check the work throughout by independent observers, and to divide the distance into short sections defined by benchmarks. As a check on individual leveling, it had been customary in Great Britain and in India to graduate the staves differently on the two sides, and always to read both sides of the staff. (2) Instrumental errors were either due to collimation, to level, or to the form of the telescope. The last mentioned only came into question when the spirit level was not permanently attached. Along with the instrumental errors must be classed those of length and graduation of the staves. (3) Errors of observation were the small graduated errors inseparable from all operations which depended upon human nerves and judgment. For any single operation they were very small, but they might amount to a considerable aggregate at the termination of a long course of work. Errors of judgment also occurred in reading the staves and the bubble, and they also arose from small oscillations of the staves from the vertical. The combination of these different errors produced the final error. DR. WHEWELL and Colonel WALKER had noticed that usually the results of leveling any given line differed according to the direction in which it was leveled. Colonel WALKER attributed this mainly to the disleveling effect of the sun's heat upon the instruments, and to errors of reading the bubble caused by the oblique direction in which the light fell upon it. The subject had received much consideration from Messrs. HIRSCH and PLANTAMOUR; but their method of combining the levels of the several sides of a polygon appeared open to several objections. As soon, however, as any network of lines had been completely leveled, there was no difficulty in applying the Theory of Probable Errors, so as to obtain directly and simultaneously the most probable values for the levels of all the points of the system. In considering the question of dealing in a satisfactory way with the adjustment of the levels on a complicated system of lines, it occurred to the author to frame Tables of Probable Errors, such as would be applicable to the circumstances of the different lines of the system. The data for framing such tables would be drawn from the official records of standard leveling in different countries, and the value of the tables when framed would depend in a great degree upon the mass of statistics which were reduced in order to compile them. The author had obtained access to the original records of the check leveling executed on long lines in Great Britain and in India, and he had extracted similar information with reference to the Swiss leveling from the "Nivellement de la Suisse." A critical examination of the discrepancies between observers on the same lines of levels showed that the average amount of the discrepancies depended very much upon the inclination of the ground. If the average inclination between two benchmarks was steep, no matter whether parts of the distance were up hill and other parts down hill, then the discrepancy was greater for that section than for another section on which the ground was flatter. By due attention to all the ascertained causes of error a high degree of accuracy might be secured. The paper closed with a reference to the results obtained in India under the management of Colonel WALKER. From the report on the spirit leveling operations in India, dated 1866, the following information had been extracted:—From Calcutta to Tilliagarhí the length was 242 miles, the maximum divergence of two observers 0·20 feet, the terminal divergence 0·15 feet; from Tilliagarhí to Patka Gerouli 346 miles, maximum divergence 0·40 feet, terminal divergence 0·38 feet; from Agra to Patka Gerouli 342½ miles, maximum divergence 0·15 feet, terminal divergence 0·06 feet.—*Iron.*

SELECTED LIST OF PATENTS.

FOR THE WEEK ENDING MARCH 17, 1876.

Relating to Mining, Metallurgy, Gas Making, Engineering, etc. Reported for the "Engineering and Mining Journal" by Louis Bagger & Co., Solicitors of Patents, Washington, D. C.

174,083. Earth Augers, A. W. Morgan, Indianapolis, Ind.—The lip of the auger bottom is made diamond shape, to facilitate the cutting of the earth. The frame of the auger-bucket is entered and locked to the shaft by two plates on the lower end of the shaft with wedge-shaped points, which fit into corresponding recesses in a sleeve on the shaft.

174,100. Metallurgic Furnaces, J. Williams, Sharpsburg, Pa.—The products of combustion are carried beneath the furnace-bed, and to a point over the hearth, where they are driven by an injector upon the hearth.

174,120. Truss Bridges, Solon Conklin, Kirkwood, N. Y.—A bridge-truss consisting of opposite arcs with a central common chord, connected by hollow struts, through which the tie rods pass, and secured by nuts on their terminal ends. Strengthening rods above and below may be used.

174,171. Hydraulic Elevators, M. L. Wyman, Boston, Mass.—The trunk of the piston occupies about one-half the capacity of the cylinder. A valve is made in the piston-head by which water can pass from the rear to the front of the piston. In elevating light loads, the passage of water aforesaid takes place, the space in the rear of piston-head having been filled from the front, in the last descent of the carriage, through a connecting pipe and cock uniting the two ends of the cylinder. In lifting light loads the water lifts by only the difference of the two areas of the piston head.

174,202. Quartz Mills, S. H. Cowles, Sacramento, Cal.—The crushing roller engages with the main wheel by spur and crown gearing, so that the wheel may rise over an obstacle without breaking the gearing. The axis of the wheel, also, for the same reason, passes through a slot in the main shaft. A plow and swash block serve to loosen the crushed ore and force the fine particles through a screen to an amalgamated plate.

NOTES.

FROM STOWELL'S *Petroleum Reporter* we take the following comparative synopsis of Petroleum reports for Jan. and Feb., 1876:

	Jan., 31 days.	Feb., 29 days.	Increase.
Stock on hand at the wells, in barrels	116,601	140,110	23,509
Production for the month	712,225	668,885	Dec. 42,340
Daily production	22,975	23,065	90
Producing wells	3,314	3,638	324
Drilling wells	142	151	9
Stock in iron tanks and pipe lines	3,379,476	3,484,371	104,895
Stock held by refiners	89,066	110,354	21,288
Total stock	3,585,143	3,734,835	149,692
Total shipments	677,289	519,193	Dec. 158,096

PENNSYLVANIA MINE LEGISLATION.—In both branches of the Legislature, recently, bills relating to the coal interests of the Commonwealth were considered, and elicited considerable discussion, from which a spectator would learn more about the tricks of the trade than he could learn by reading in a long time. The Senate considered, amended, and passed on second reading a supplement to an act entitled "An act providing for the health and safety of persons employed in coal mines," approved March 3, A. D. 1870, increasing the number of inspector of coal mines and collieries. It provides that the number of inspectors of coal mines and collieries, to be appointed for the counties of Luzerne and Carbon, shall be three, who shall be assigned to duty in separate districts, to be laid out and fixed by examiners as provided in the act to which this is a supplement, and for the collieries in the counties of Schuylkill, Dauphin, Northumberland, and Columbia, the number shall be five, assigned in the same manner. The salaries were fixed at $2,000 each, to be paid by the State Treasurer on the warrant of the President Judge of Common Pleas of Luzerne county, for the inspectors of Luzerne and Carbon, and the President Judge of Schuylkill county for the inspectors of Schuylkill, Columbia, Northumberland, and Dauphin counties. It is also provided that the act shall not go into effect until sixty days after its approval by the Governor. Considerable discussion took place on the bill entitled "An act to secure to miners engaged in mining anthracite coal a proper recompense for their labor." Mr. HUHN opposed the bill on the grounds that it was unconstitutional, and was of the character known as class legislation. He asserted that it applied to a special class, and that bricklayers, carpenters, or any other class of tradesmen could, with equal propriety, demand the same kind of legislation. He was supported in his views by Messrs. WOLFE, CHRISTY, and REIGHARD. Messrs. FINCHER and FOSTER took strong positions in support of the bill. After the various sections had been amended and agreed to, Mr. HUHN moved to amend the title as follows: "An act to compel the erection of collieries in the anthracite regions by corporations or private individuals, and to hand them over to the employes thereat, or other party, free of charge, and providing that the State shall reimburse any losses which may be incurred in the working of the same."

CHESAPEAKE AND OHIO CANAL EXTENSION.—The report of Major MERRILL, of the engineer corps, on the continuation and completion of the Chesapeake and Ohio Canal, has been made to the chief of engineers. He says the narrowest place through which a passage must be found for the canal is just above Cumberland. Here the space between the two halves of Will's Mountain is occupied by two lines of railroad on one bank, and the National road on the other. The plan recommended consists substantially in widening the stream as far as possible, sustaining the sides by vertical walls of masonry, and then placing the canal in the bed and isolating it from Will's Creek by a strong masonry division wall. The most difficult point was how to get it into the "Narrows" at the upper end without interfering with the numerous railroad tracks, or with the National road. Maps are appended to the report explaining the method which has been adopted. Major MERRILL regards slack water navigation below Connellsville, with locks for barges, as better than an independent canal. He expresses the opinion that in a few years steam will be in general use on all first-class canals. The following are the estimates for the total cost of a first-class canal from Cumberland, Md., to Connellsville, Pa., and of a system of locks and dams on the Youghiogheny from the latter place to McKeesport, on the Monongahela, whence to Pittsburgh there is a slack-water system in actual operation:

Canal proper	$20,173,795
Additional cost of new terminus at Connellsville	75,245
Summit reservoirs, approximately	600,000
Additional cost of inclined planes	1,134,000
Total estimated cost of canal	$22,983,040
Estimated cost of slack-water on Youghiogheny	1,254,040
Total cost of the water-route from Cumberland to Pittsburgh	$24,237,080

These estimates would have been materially reduced if the dimensions of the line had been restricted to those on the existing canal, but he estimated for a canal larger than the Erie, because it was evident that the route from Cumberland to Pittsburgh could have little claim for national aid unless it should prove practicable for a canal of the width and depth necessary for the most economical transportation. From Cumberland to George's Creek the estimate for the cost of the canal is $2,238,244.

THE HUDSON SUSPENSION BRIDGE.—It is announced on good authority that arrangements have been made for the construction of the Hudson Suspension Bridge, and that the work will be begun within a short time. The following are the general dimensions of the proposed work :

	Feet.
Entire length	2,230
Distance between centers of towers	1,680
Clear span	1,630
Clear height above water	165
Railway grade above water	190
Height of towers above water	340
Deflection of cables	137½
Width of girder	37
Width of railway deck	16
Distance between high water marks on line of bridge	1,587

The strength of the work is to be very great. About six times as great, foot for foot, as that of the Railway Suspension Bridge over the Niagara River. Though very rigid and stiff beneath passing loads the bridge is so designed that it will not be strained in any part by the expansion and contraction of the metals of which it is composed. The difficulty of accomplishing this result has been very great, as will be readily understood, when it is stated that in some parts of the work there will be a motion of more than three and a half feet from this cause alone. The means used are, however, very simple and perfect in their action and will never require any more attention than the other parts of the work, being automatic and incapable of getting out of order. The towers are to be of wrought iron with granite foundation piers ; the cables and backstays of the best steel, in links and pins, not wires. The rest of the work is to be wrought iron of the best quality. The anchorage and foundations are in solid rock. The bridge does not encroach upon the waterway of the river at all, and can never for a moment interfere with navigation, either during its construction or afterwards. The site is at Anthony's Nose, four miles above Peekskill, which is the best crossing between New and Albany.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending March 18.

Tons of 2,240 lb.	1876.		1875.	
	Week.	Year.*	Week.	Year.*
Wyoming Region.				
D. and H. Canal Co	†....	240,866	40,732	543,047
D. L. and W. RR. Co	6,948	212,540	48,548	413,756
Penn. Coal Co	....	179,259	17,198	226,250
L. V. RR. Co	11,945	132,227	7,604	219,080
P. and N. Y. RR. Co	....	3,952	1,070	3,785
C. RR. of N. J	1,071	116,745	6,962	46,312
	19,964	885,539	122,114	1,482,230
Lehigh Region.				
L. V. RR. Co	11,098	244,600	2,675	96,903
C. RR. of N. J	2 974	142,039	728	5,030
D. H. and W. B. RR	978	7,647	1,172	5,691
	15,050	394,286	4,575	107,624
Schuylkill Region.				
P. and R. R. RR. Co	17,417	305,365	29,791	195,894
Shamokin & Lykens Val.	5,510	40,148	16,802	119,756
	22,927	345,513	46,593	315,650
Sullivan Region.				
Sul. and Erie RR. Co	1,248	12,127	265	2,735
Total	59 189	1,637,515	173,547	1,908,239
Increase	..	..	..	..
Decrease	..	..	..	..

* Year beginning January 1st.
† This reports has not been received for six weeks.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

The receipts at Port Richmond for the week were 425 tons, shipments 11,000 tons, and balance on hand 83,000 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch. and Cumberland and Pennsylvania Railroads amounts to 1,339 tons, as compared with the corresponding period in 1875.

Receipts of Coal at Boston, for week ending March 17, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	—	55,064	45,700
Philadelphia	3,000	351,640	256,432
Baltimore	1,018	73,879	72,144
Other places	770	156,887	103,273
Great Britain	—	2,510	2,124
Nova Scotia	—	12,851	14,105

The Exports of Coal from Baltimore for the week were 2,223 tons, and since Jan. 1st, 6,013 tons, as against 7,897 tons for the corresponding period of 1875.

Belvidere Delaware RR, report.	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	—	1,645	..
" " " South Amboy	1,095	85 378	16,807
Shipments at Coal Port (Trenton)	—	..	..
" South Amboy	7,290	70,728	70,269

The Production of Bituminous Coal for the week ending March 18, was as follows :

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week. Tons.	Year Tons.
Tons of 2,240 lb	27,971	216,135
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	6,313	175,397
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	2,888	31,667
*East Broad Top	1,545	14,936
Clearfield Region, Pa.		
*Snow Shoe	1,343	11,986
*Tyrone and Clearfield	22,096	192,471
Allegheny Region, Pa.		
*Pennsylvania RR	4,555	40,309
Pittsburgh Region, Pa.		
*West Penn. RR	5,376	44,918
*Southwest Penn. RR	892	13,156
*Penn. & Westmoreland gas coal, Pa. RR.	5,765	126,403
*Pennsylvania RR	6,302	71,057

* To March 14.

The Production of Coke for the week ending March 14.

Tons of 2000 lb.	Week. Tons.	Year Tons.
Tyrone and Clearfield	..	..
Alleghany Region	..	..
West Penn. RR	1,041	9,600
Southwest Penn. RR	8,101	83,757
Penn. & Westmoreland Region, Penn. RR.	153	6,156
Pittsburgh, Penn. RR	3,967	44,819
Total	13,362	144,332

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 25, 1876.

Anthracite.

A number of collieries have resumed operations; others will resume on Monday ; and on the 3d prox. all will have started. The demand for immediate shipments is very small, and the indications are that there will not be as great inquiry for coal in April, as usually prevails in that month. With this view the Combination will curtail shipments for next month to the extent of 200,000 tons. All the companies are in receipt of applications for large amounts of coal to be delivered during the season, but this is no indication of the quantities likely to be taken by applicants. All applications must be entered with the companies before April 1st.

WE received the following circulars from the Philadelphia and Reading Railroad Company last week, too late for publication. The first bears date of the 16th inst. and the second the 15th inst.

SUPPLEMENT TO CIRCULAR No. 5.—1876.

Notice is hereby given, that in making calculations to ascertain the amount of drawbacks to be paid upon coal shipped by canal, under the provisions of Circular No. 5, no higher sum will be allowed as freight than that current at the time of each shipment by the transportation line of this Company.

CIRCULAR No. 6.—1876.

If any contracts of not less than 1500 tons for lump, steamer, broken, chestnut, or pea coal are made with manufacturers for their own consumption at any point named upon the freight and toll sheets of the Company not within the competitive districts of the associated companies, or at any point which may be reached by canal from Columbia, at not less than the following prices at Schuylkill Haven :

Lump and Steamer, $2.60; if for furnaces or rolling mills, $2.50;
Broken..... 2.80;
Chestnut..... 2.40;
Pea..... 1.20;

and the coal so sold is shipped from Schuylkill Haven, Pine Grove, Tamaqua, or Port Clinton at any time before the 31st of December next, the Company will agree that the freight and tolls upon coal shipped to fill such contracts shall not be advanced, or, that if the freight and tolls are advanced, there will be paid to the consignee, after such advance, such a sum as drawback as will make the freight and tolls equal to those now in force ; provided that in all shipments by canal no higher sum as freight will be allowed in the calculation to ascertain the amount of drawback, than that current at the date of each shipment by the boats of the Company; and provided that no payment of drawback shall be made until the entire amount of the coal so contracted for shall have been shipped within the period above named ; and provided further, that all such contracts shall be filed in the office of the Company on or before the fifteenth day of April, 1876 ; and that upon the presentation of any such contract, the Company shall have the right to determine whether the purchaser named in such contract is a manufacturer, within the meaning of the term as herein used.

Bituminous.

It is rumored that one of the Cumberland companies has made contracts to supply, for the year, a Boston Ferry Company and the White Star Steamship Company—the two contracts supposed to aggregate about 50,000 tons although we were unable to learn particulars. There is a disinclination on the part of the Cumberland companies to name prices until the question of freights is fully settled. Of course, the bill signed last week by the Governor of Maryland, to reduce freights on the Cumberland and Pennsylvania RR. is now in force, but it is thought that the Consolidation Coal Company will offer resistance to it. A delay in the presentation of freight bills would indicate that such action is under consideration. Public sentiment is so strong against this company, that whatever its immediate action may be, it will surely end in defeat, should it seek to oppose this reasonable reduction in its charges. An attempt to defy the law and refuse to carry coal, except at the old rates of freight, would make it liable to damages, which would seriously affect its financial standing. Last year there was but very little business done in bituminous coals until about the middle of April and there is no reason to look for much business earlier this year. There is a very fair quantity of coal being shipped from Central Pennsylvania and some of the companies are reported to be contracted well ahead. The rates for these coals range from about $4 60@$4.75 at South Amboy.

The Maryland Coal Company is inviting proposals to carry its coal on the Chesapeake and Ohio Canal for the season of 1876. This is an important change in the mode of doing this business, and indicates that this company, at least, believes that the reign of the "Canal Ring" has passed.

Gas Coals.—It is reported that a contract has been made to furnish a Boston Gas-light Company, with 20,000 tons of gas coal at $4.05. f. o. b. at Baltimore, this is not generally credited as it is believed that the Penn Gas Coal Company secured a contract to supply the company referred to with 60,000 tons, being all it will require. There appears to be a very unsettled feeling among the miners on the Youghiogheny and some additional strikes are anticipated.

Wholesale Prices of Anthracite Coal for March, f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	4 60	4 70	4 80	4 90	5 50	4 70
Pittston at Newburg	4 45	4 55	4 65	4 75	5 35	4 55
Wilkesbarre at Port Johnston	4 60	4 70	4 80	4 90	5 50	4 70
Plymouth, R. A.	....	....	4 80	5 00	5 60	4 80
Susque. Coal Co. at Amboy W.A.	4 60	4 70	4 80	5 00	5 50	4 80
Kingston at Hoboken	4 60	4 70	4 80	4 90	5 50	4 70
Lehigh Coals.						
Old Company at Port Johnston	5 10	....	4 90	4 90	5 50	4 80
Old Company's Room Run "	5 10	....	4 90	4 90	5 50	4 80
§Sugar Loaf, Hobok. & Amb."	5 10	....	4 90	4 90	5 50	4 80
Lehigh Coal Exchange "	5 10	....	4 90	4 90	5 50	4 80
Honey Brook Lehigh	5 10	....	4 90	4 90	5 50	4 80
Beaver Meadow at South Amboy	5 10	...	4 90	4 90	5 50	4 80
Schuylkill Coals at North 9th st., Brooklyn, E. D.†						
Schuylkill white ash	4 60	4 70	4 80	4 90	5 50	4 70
Schuylkill red ash	...	....	....	5 00	5 60	4 70
Shamokin white and red ash	....	....	....	5 00	5 60	4 70
Lorberry	....	....	5 70	5 70	5 70	4 75
Lykens Valley	..	....	6 10	6 10	6 10	5 20

* Contractor's prices are 20c. per ton less.
† The prices of Schuylkil coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.
‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York 35@40c.	
" " Elizabethport & Port Johnston to N. York.	40c.
" " South Amboy to New York	40c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Prices of Anthracite Coal, f.o.b. at New York Shipping Ports, to actual consumers with whom season contracts may be made.

	Lump.	Steam.	Broken.	Chestnut
March	4 20	4 30	4 40	4 30
April	4 20	4 30	4 40	4 30
May	4 25	4 35	4 45	4 35
June	4 30	4 40	4 50	4 40
July	4 35	4 45	4 55	4 45
August	4 40	4 50	4 60	4 50
September	4 45	4 55	4 65	4 55
October	4 50	4 60	4 70	4 60
November	4 55	4 65	4 75	4 65
December	4 60	4 70	4 80	4 70

Prices at Port Richmond, Philadelphia, will be 35c. per ton, less than the above.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	.. ..
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt	4 25	5 75
Despard, West Va.	4 50	0 00

Murphy Run, West Va., at Baltimore..	4 50	6 00
Fairmount, West Va., " " ...	4 50	6 00
Newburgh Orrel, Md. " " ..	4 50	6 00
Cannelton Cannel, W. Va., at Richmond.	8 75	10 50
" Splint, " "	4 50	6 00
Peytona Cannel, " "	8 75	10 50
Straitsville " at Sandusky, O.....	nominal.	

Manufacturing and Steam Coals.

Cumberland, at Georgetown and Alexandria, Va.....	3 75@3 85	5 25@5 35
Cumberland, at Baltimore .....4 00@4 10		5 25@5 35
Kittanning f.o.b. Canton, Baltimore..4 25@4 35		

Broad Top, at the mine, per 2,000 lb., 1 10. f. o. b. Greenwich, Philadelphia, per 2240 lb , 3 90, 4 00. 4 25 and 4 50, according to destination ; at Amboy, 5 00 ; New York, 5 45.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 90 ; at Greenwich, Phil., per 2240 lb., 3 90, 4 00. 4 25, and 4 50, according to destination ; f. o. b. South Amboy, N. J., 5 00 ; New York, 5 45.

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool....	26/	13 00
Ince Hall Cannel " ...	42/	18 00@20 00
" Gas Cannel " .	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	5 00
Caledonia, at Port Caledonia.....	1 60	4 75
Glace Bay, at Glace Bay.....	1 60	4 75
Lingan, at Lingan Bay.....	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard.....	$5 50	$5 80	$5 10
Lackawanna coal, delivered	6 25	6 50	6 00
Wilkes-Barre, "	6 50	6 75	5 75
Lehigh & Locust Mountain, del'd..	6 00	7 00	6 00
Schuylkill Red Ash, del'd	7 50	8 00	

Our retail quotations of Pittston Coal are based on the actual selling rates of the company, nominal quotations of grate and stove are 20c., and of nut 30c. per ton above these rates. The Cost of delivery ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb.				....$23 00
Liverpool House Cannel	"	"	"	....†22 00
American "	"	"	"	.... 13 00
Kanawha splint,	"	"	"	.... 15 00
American Orrel	"	"	"	....11@14
Red Bank Cannel	"	"	"	..... 14 00
Cumberland	"	"	"	.... 7 00

† This quotation is furnished to us by Messrs. WARD, TALBOT & OLYPHANT.

Baltimore, Md. March 21, 1876.

Reported by our Special Correspondent.

No change.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth, White ash.	In cars at depot.	By boats afloat.
Lump and steamboat.....	$4 80	$4 65
Broken.....	5 55	5 40
Egg.....	5 92	5 77
Stove.....	6 17	6 02
Nut.....	4 97	5 10
Shamokin, (red or white ash), and "Boston," free burning white ash,		
Egg.....	5 95	5 79
Stove.....	6 15	5 99
Lykens Valley, red ash,		
All sizes.....	6 55	6 37

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2240 lb. $7 00@8 00.

BITUMINOUS.

George's Creek and Cumberland f. o. b. at Locust Point.	4 15	4 50
West Virginia f. o. b. at Locust Point		5 50
Youghiogheny Gas, f. o. b. at Locust Point.....		5 50
Swanton Coal, George's Creek.....		4 40

Boston. March 18, 1876

Coal has a little more interest for anthracite. The withholding of orders for a month pending the settlement of the combination issues has left some manufacturers and yards bare of stock. The orders that are placed are on the lists as given three weeks ago, which have been voted to continue through April. There is some irregularity in prices, and a rumor current that no stipulation as to quantity would be required of a consumer. The street is full of gossip as to the methods to get in under the cover of the first circular quotations. Coal and yard men are not wanting who are boastful of their ability to dodge all the corners the combination have set up. The whole anthracite coal traffic seems running upon an ability for trickery, and not with reference to the open questions of supply and demand, or the plain, unvarnished circulars of the coal combination. Retail prices on the wharf have been named. Furnace, $6.50 ; egg, $7 ; stove, $7.25 ; but a number of greenhouse men and down-town steam users have been quoted 25 to 30c a ton less price.

BITUMINOUS has been interested in the news that the Governor of Maryland has signed the freight rate force bill which reduces the carrying charges on coal 1c. per ton on the 26 miles of the Consolidation Company's road, and hence gives all Cumberland coals a more equal chance. There is a credited report current that the New Haven road have made a 50,000-ton contract at $4 f. o. b. at Baltimore, thought to be a very full price.

GAS COALS have been in better request, four or five of the largest New England companies having given out contracts. The quotation is $4.25, from which the Penn and Westmoreland are understood to make a discount according to quantity. The Youghiogheny's coals have made no quotations since this new move. Moores being understood as perfecting a new arrangement with the Baltimore and Ohio road for a concession in its freight to meet the rates of the Pennsylvania road.

FREIGHTS are quiet. A schooner charter from Philadelphia to Providence at $1.45 ; same port to Boston at $1.60 ; and New York to Boston $1.10 and $1.15,—are the business.—*Commercial Bulletin.*

Buffalo, N. Y. March 21, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

	Afloat f.o.b.	Retail. Deliv'd.
Grate.....	$6 40	$7 40
Egg.....	6 40	7 40
Stove.....	6 85	7 85
Nut.....	6 60	7 60

	Lump.	Run of Mine.	Nut.	Slack.	Nut & Slack.
Connellsville Coke....	$5 15	....	....	....	....
Brookfield Coal.....	4 30	....	2 80	....	....
Briar Hill.....	....	....	....	....	....
Youghiogheny.....	4 75	....	....	....	....
Monterey.....	3 30	3 25	....	2 30	....
Catfish	....	....	....	....	....
Stoneboro.....	....	Bk'n	....	2 30	....
Cannel	5 50	4 75	4 30	....	....
Cameron	3 75	3 00	....	2 30	....
Reynoldsville.....	4 00	3 75	3 75	3 25	....

Chicago, Ill. March 21, 1876.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

Retail prices per ton of 2000 lb. delivered to buyer.

		BITUMINOUS.	
Lehigh Lump.....	$10 50	Briar Hill and Erie	@ 7 00
Lehigh grate and egg ...	10 50	Walnut Hill, Pa.....	@ 6 50
Lehigh stove and chest..	11 00	Midway, Pa.....	@ 6 50
Lackawanna, Wilkes Barre and Pittston*		Cannel.....	@ 8 00
		Blossburg.....	7 50
Grate and egg.....	9 50	Indiana Block.....	6 00
Stove and chestnut.....	10 00	Hocking "Brooks".....	6 50
		Wilmington and Illinois.	5 00

* 50 cents off these prices for car load lots to country dealers and manufacturers.

Cincinnati, O. March 20, 1876.

Reported by our Special Correspondents.

But slight change in price of coal. We quote to-day:

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat.....	8 c.	——
Pomeroy coal.....	5 c.	——
Kanawha "	7½c.	——
Cannel coal, according to quality "	11@16 c.	——
The following are the retail prices delivered		
Pittsburgh coal, per load of 25 bus.....		$3 00
Youghiogheny.....	—c.	3 00
Pomeroy	11c.	2 50
Cannel	—c.	5 50
Kanawha Semi-Cannel.....	—c.	3 00
Anthracite, per ton.....		10 00@11 00
Coke, at yard.....	7c.	——
Coke, hard and soft, delivered.....	9c.	——

Cleveland, O. March 20, 1876.

Specially reported by Messrs. WARNER, BATES & Co.

WHOLESALE.

Per ton of 2000 lb. f. o. b. vessels.

	For vessels.	On cars.
Youghiogheny Gas Coal.....	$4 40	$4 15
Cannel	4 50	4 15
Blossburgh.....	5 00	5 00
Briar Hill, Block Coal.....	3 80	3 60
Hocking Valley.	3 25	3 10
Straitsville Coal Co., lower vein	3 25	3 10
Massillon	3 10	3 30
Tuscarawas Valley.....	2 85	2 70
Columbiana.....	2 80	2 60

RETAIL DELIVERED.

	Lump.	Nut.
Briar Hill.....	$5 00	$3 50
Massillon	4 50	4 00
Mineral Ridge.....	4 50	4 00
Columbiana.....	3 25	3 00
Straitsville Coal Co., lower vein,	4 00	3 00
Tuscarawas Valley.....	3 25	3 00

ANTHRACITE DELIVERED.

	Grate.	Egg.	Stove.	Chestnut.
Lehigh.....	$9 00	$9 00	$9 50	$9 25
Wilkes-Parre.....	8 10	8 10	8 50	8 25
Lackawanna.....	8 10	8 10	8 50	8 25

Detroit, Mich. March 20, 1876.

Specially reported by Messrs. ROBINSON & KEYS, Dealers in all kinds of coal.

Per ton of 2000 lb.

Lehigh Lump, per ton.	$10 50	Blossburg.....	8 50
Lehigh " prep.sizes.	10 00	Briar Hill.....	7 50
Wilkes-Barre, Grate and Egg	9 00	Willow Bank.....	7 00
		Erie.....	50
Wilkes-Barre, Stove and Nut.....	9 50	Massillon.....	7 00

Erie, Pa. March 20, 1876.

Wholesale, per ton of 2000 lb.		Bituminous f. o. b.	
Briar Hill lump.....	$3 75	Beaver lump...	$3 50
Midway.....	3 25	Cat Fish.....	3 00

Indianapolis, Ind. March 21, 1876.

Specially reported by Messrs. COBB & BRANHAM.

We quote coal in our market as follows :

Wholesale on board cars, and retail delivered to consumers.
Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

IndianCreek, per ton....	$2 75	Peytona cannel, per ton.	7 00
White River, "	2 75	Indiana Cannel.....	6 50
Brazil Block, "	2 90	Hocking Valley.....	4 25
Highland, grate, "	2 50	Youghiogheny	4 75
Block coal, nut, per car..	18 00	Blossburg (smithing)...	6 50
Highland " " ...	18 00	Piedmont "	6 50
Block Slack " ...	17 00	Gas coke, per bushel.....	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken.....	$8 70	Nut.....	8 75
Egg.....	8 70	Stove.....	9 00

Lehigh Anthracite.

Broken.....	10 35	Nut.....	10 35
Egg.....	10 35	Stove.....	10 60

Retail, per bushel, delivered.

Sand Creek.....	16c.	Block Nut, steam.....	9
White River.....	14	" Slack, "	8
Brazil Block.....	15	Peytona Cannel.....	28
Highland grate.....	13	Virginia "	27
Block Nut, domestic use.	12	Youghiogheny	22
Highland Nut, " " .	12	Blossburg.....	26
" " steam	9	Piedmont.....	26

GAS COKE (measured.)

Crushed.....	15c	Lump.....	12c.

ANTHRACITE,

Wilkes-Barre and Lackawanna (all sizes).....	$9 75 per ton,
Lehigh, retail	$11 50 per ton.

Louisville, Ky. March 21, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Our market is now, as during most of the Winter, very quiet.

Please report our prices as follows :

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c	Pine Hill.....	—
Raymond City.....	9c.	Kentucky.....	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh.....	12c.	Peytona Cannel	20@22c.
Raymond City.....	11c.	Buckeye "	20c.
Pine Hill.....	13c.	City-made Coke.....	10c.
Kentucky.....	10c.	Auth., per ton, $10 00 to 10 50	
Screened Pittsburgh per load.....		$3 00	
Screened Raymond City.		2 75	
Pine Hill (Kentucky).....		7 75	
Cannel.....		$5 to 5 50	

Milwaukee, Wis. March 20, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Our market in coal remains unchanged with but little demand. Prices remain the same.

Retail price per ton of 2000 lb.

Lehigh Lump.....	$10 00	Briar Hill, select	$8 00
Lehigh Prepared.....	11 00	Blossburgh	8 00
Lackawanna (all sizes)..	10 00	Cannel	8 00
Pittston.....	10 00	Pittsburgh	7 00
Scranton.....	10 00	Steam coal...	5 00

Richmond, Va. March 21, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel.....	$9 00	New River Bituminous,	$4 50
" semi-Cannel..	4 75	Clover Hill Coal.....	4 00
Coalburgh Splint.....	4 75	James River bitum ...	3 30
Lewiston "	4 75	" " Carbonite,	5 80
Kanawha Gas coal.....	4 50		

New Orleans, La. March 20, 1876.

Reported by C. A. MILTENBERGER & Co.

Pittsburgh coal, retail, per bbl.....	55c.
" wholesale.....	28c.
" steamboats, per box.....	50c.
" to manufacturers, per bbl.....	45c.
" shipments, per hhd..... ..	$6 00
Anthracite, wholesale, per ton.....	....
" retail, "	....
Virginia Cannel, per bbl.....	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl.....	...
" " retail, "	....
St. Bernard wholesale, per bbl	50c.
" retail, "	....

San Francisco, Cal.

From the *Commercial Herald*, March 9, 1876.

Imports from Jan. 1st to March 1st :

	tons.		tons.
Anthracite.....	4,139	English.....	5,502
Australian.....	11,823	Vancouver Island....	10,657
Coos Bay.....	7,520	Rocky Mountain.....	64
Cumberland.....	2,044	Seattle	12,854
Mt. Diablo.....	17,700	Bellingham Bay.....	3,175

The market is without notable change, with free spot supplies of all needed varieties. Cargoes of English and Scotch, to arrive, cannot be quoted better than $8.50@9 for forward delivery. The Vancouver Island mines are yielding largely of superior quality. The receipts for the week under review embrace the following cargoes ; From Seattle, W. T., *J. B. Bell*, 1,100 tons : *Lookout* 1,309 tons Bellingham Bay ; *American Girl*, 300 tons Coos Bay ; Candida, 1,181 tons from Ardrossan, etc. In the absence of reported sales, we quote Australian $10.25@10.50 ex ship. Supplies of Cumberland are well controlled, and in casks held at $22 ; bulk, $18. Lehigh is plentiful and prices nominal. We quote Bellingham Bay at $8.50 ; Coos Bay $10 ; California Mt. Diablo Steam, $6.25@8.25 for fine and coarse respectively ; English and Scotch Steam, $9.50@10 ; Nanaimo, $9.50@10 ; Seattle, $9.50@10 ; Anthracite, $12@15 ; Lehigh, $14@15 ; Wellington, $10.50@11. Late receipts include the *Samoset's* cargo of 1,000 tons Seattle to the Renton Coal Company.

Toledo, Ohio. March 20, 1876.

Specially reported by Messrs. GOSLINE & BARBOUR.

We quote coal as follows :

Per ton of 2000 lb. on cars.

Hocking Valley.....	$3 40	Massillon	3 60
Straitsville.....	3 40	Youghiogheny.....	5 00
Shawnee.....	3 40	Blossburg	6 50@7 00
" nut.....	2 90	Cumberland.....	6 50@7 00
Briar Hill.....	5 50	Connellsville coke	6 40

ANTHRACITE.

Grate, screened.....	$7 20	Stove, screened.....	$7 70
Egg, "	7 20	Chestnut "	7 45
Lehigh Lump.....	9 50		

40 cents to $1 per ton additional for delivery at retail.

Halifax, N. S. March 20, 1876.

Prices per ton of 2240 lb. in gold.

Sydney (old mines).....	$4 00	Little Glace Bay.....	3 35
Gowrie.....	3 35	Blockhouse.....	3 35
Victoria.....	——	Albion (at Railroad).....	4 00

Toronto, Ont. March 20, 1876.

Chestnut.....	$7 25
Stove.....	7 50
Egg and grate.....	7 25
Bituminous coal for domestic use.....	6 00
" " steam.....	3 50@5 50
Lehigh Lump and broken.....	7 50
Blossburgh.....	6 50

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey ..	2 30	2 16	2 74	2 63	2 86
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	70
‡ Phillipsburg, N. J., (46 miles)	86	72	1 21	1 19	1 42
Elizabethp't, (114 m.) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	1 94	1 80	2 29	2 27	2 50
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	2 30	2 16	2 63	2 63	2 86
Jersey City, N. J., (121 miles) and New York, via L. V. RR	2 30	2 16	2 63	2 63	2 86
Andover, via Delaware, Lackawanna and Western RR	3 30	3 10	3 70	3 69	3 99
Trenton Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34
Trenton, (97 m.) for shipment, including shipping and wharfage	2 11	1 95	2 45	2 46	2 76

From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Lehigh Valley RR. $2 37

From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR 1 75

††From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware. Lackawanna and Western RR., Morris and Essex Division 1 14

From *Lackawanna Junction* to **Auburn, N. Y.*, (191 m.) for shipment, via Southern Central R R. in connection with Pa. and N. Y. R.R. 2 53

From *Lackawanna Junction* to *Weedsport* (201 m.), for *Rochester and Charlotte* 2 59

From *Lackawanna Junction* to *Sterling* for *Oswego, N. Y.* .. 2 62

‖ To this point for all places between Rochester and Buffalo the rate is 2 53

* The rate to this point for Syracuse is 2 08

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

The distances in the above table are computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

Freights on Bituminous Coal and Coke over the Chesapeake and Ohio Railroad.

To	From New River District, say, at Quinnemont. Bituminous Coal and Coke. Distances.*	Regular Rate.	Special Rate.	Coal Screenings. Rate.
	Miles.			
Charleston	75	1 00	70	50
Huntington	127	1 20	80	60
Staunton	158	2 30	2 60	1 50
Charlottesville	197	2 80	2 50	2 00
Gordonsville	218	3 00	2 70	2 40
Hanover Junction	276	3 25	3 10	2 50
Richmond	294	3 25	3 10	2 50
Richmond *via* Hanover Junction		3 50	3 35	2 75
James River	297	3 25	3 00	2 50

To	From Kanawha District, say, at Blacksburg. Bit. Coal and Coke. Regular Rate.	Special Rate.	Cannel Coal. Regular Rate.	Special Rate.	Coal Screenings. Rate.
Charleston	80	50	1 20	80	40
Huntington	1 00	60	1 50	1 00	50
Staunton	3 00	2 50	4 00	3 50	2 00
Charlottesville	3 30	2 80	4 25	3 70	2 30
Gordonsville	3 35	2 90	4 40	3 90	2 40
Hanover Junc	3 40	3 10	4 50	4 10	2 50
Richmond	3 40	3 10	4 50	4 10	2 50
Richmond, *via* Hanover Junc.	3 65	3 35	4 75	4 25	2 75
James River	3 40	3 00	4 50	4 00	2 40

A Terminal charge of ten cents per ton, in addition to rates above, will be collected on all coal and coke at James River. Also, at Huntington, a charge of five cents per ton for transferring by tipple, or ten cents per ton for transfer from car to barge on the river track.

This Tariff supersedes all *Special Rates* on coal and coke to any station, except existing special rates to iron furnaces.

Local Tariff No. 7 will govern rates to all stations, excepting as modified by this special tariff but the rate to any station, between the stations above designated, shall in no case exceed the rates named herein, to the first point beyond it, of the stations above named.

Special Rates—The rates given above in columns headed "Special Rates," will apply on all shipments of coal or coke mined or made on the line of this road, destined for use in steam or manufacturing purposes; also on all shipments destined for any point off the line of the Chesapeake and Ohio Railroad.

Agents, when they cannot be certain that shipments are destined for use in steam or manufacturing purposes, will collect freight at regular rates as above, and overcharges, if any occur, will be promptly refunded through the General Freight Office.

A charge of twenty-five cents per ton, in addition to all rates herein given, will be made for delivery of coal or coke at points *between stations* requiring the use of an engine.

Coal Screenings—By "Coal Screenings" is meant dust, nut and fine coal that will pass through a screen of one and a half inch meshes, and will only be taken at the Company's convenience.

* These distances are computed from Quinnemont (or the New River District) Blacksburg (or the Kanawha District) lies 56 miles west of Quinnemont, which distance will be added to all coal going east of the New River District and deducted from Huntington and Charleston, which lie west of the same.

Freights.

Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	....
Albany	....	....	....	....
Amesbury, Mass	....	....	....	....
Bangor, Me	....	....	....	1 00
Bath, Me	....	1 65	....	1 00
Baltimore	....	....	....	....
Boston, Mass	1 25@1 50	1 50	150–55	1 00
Bridgeport, Ct	*70	1 40	....	70
Bristol, R. I.	....	....	....	85
Cambridgeport, Mass.	§1 25@1 50	....	....	1 00
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	§1 25@1 50	....	....	§1 00
Fall River	1 25	1 40	....	95
Hackensack	....	....	....	....
Hallowell, Me	....	....	....	....
Hartford	....	....	....	....
Hoboken	†70	1 20	1 25	40
Hudson	....	1 20	....	....
Jersey City	....	1 20	1 25	40
Lynn, Mass	....	..	....	†1 00
Middletown	....	....	....	1 00
Mystic	....	....	....	....
Newark	....	1 50	....	....
New Bedford	1 30	1 40	....	85
Newburyport	....	1 65	....	1 10
New Haven	*70	1 40	1 35	70
New London	1 25	1 40	....	80
Newport	1 25	....	....	85
New York	70††	1 20	1 25	40
Norfolk, Va	....	....	....	....
Norwalk	70‡	....	....	70
Norwich	1 25‡	....	....	90
Pawtucket	1 75‡	....	....	....
Philadelphia	....	....	....	....
Portland	....	1 50	....	1 00
Portsmouth, N. H.	1 50	1 65	....	1 10
Providence	1 25	1 40	....	85
Petersburg, Va	....	90	....	....
Portsmouth, Va	....	....	....	....
Poughkeepsie, N. Y.	....	....	....	....
Richmond, Va	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	....	....
Sag Harbor	....	....	....	1 00
Salem, Mass	1 50	1 50	....	1 00
Salisbury Pt., Mass	....	....	....	....
Savannah, Ga	....	....	....	....
Stamford	*70	....	....	70
Stonington	....	....	....	....
Taunton	....	....	....	....
Trenton, N. J	....	....	....	....
Troy	....	....	....	....
Warren, R. I.	....	....	....	85
Washington, D. C.	....	....	....	....
Wareham	....	....	....	....
Weymouth	....	....	....	....
Wilmington, Del	....	....	....	....
Wilmington, N. C.	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Towing.

Rates of Towing from New York to places on the *Hudson River*.

Boats of 175 tons capacity and upwards.

Per ton of 2240 lb.

	cts.		cts.
Manhattanville	8	Haverstraw	16
Spuyten Duyvel	8	Verplanck's Point	16
Yonkers	9	Peekskill	16
Hastings	11	West Point	17
Piermont	12	Cold Spring	17
Dobbs' Ferry	12	Newburg	18
Nyack	15	Poughkeepsie	20
Tarrytown	15	Rondout	23
Sing Sing	15	Hudson	25
Croton Landing	16		

Rates for boats of 100 tons, per boat, are as follows:

	cts.		cts.
Manhattanville	10	Sing Sing	20
Spuyten Duyvel	11	Peekskill	20
Yonkers	15	Newburg	25
Tarrytown	18	Poughkeepsie	30

Special Rates will be made for Saugerties and Catskill.

East River, from the foot of Twenty-third street, to the following points, *and return*, per ton:

	cts.		cts.
New Haven	33	Milford	40
Branford	45	Bridgeport	33
Southport	40	Westport	40
Norwalk	33	Middletown	65
Hartford	75	New London	60
Norwich	68	Stonington	75
Mystic	75		

Derby 33 cts. per ton and $50 per boat extra.

Bristol, Fall River, Providence, New Bedford, *Special rates*.

Boats having less than 200 tons, will be charged the same as if carrying that quantity.

Rates via the Hudson River are furnished to us by A. B. VALENTINE, No. 41 Jay Street. Rates via the East River are furnished by W. E. GLADWISH, No. 12 South Street.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, March 24, 1876.

American Pig.—We are reported sales 800 tons of forge at $20, and 400 tons of No. 1 and No. 2 foundry iron at quotations, all by the Thomas Company. There are some inquiries for forge at low figures, but there have been no sales. Prices are unchanged, yet most, if not all, important transactions, are supposed to show some concession. We quote No. 1 foundry at $23; No. 2 $21; and forge at $19@$20.

Scotch Pig.—There is a little better inquiry for Scotch. We note sales of 150 tons of Eglinton, and 50 tons of Coltness, on private terms. Prices are unchanged and as follows: Eglinton, $29@$29.50; Glengarnock, $31; Coltness, $32.50@$33; and Gartsherrie, $32.50.

MESSRS. JOHN E. SWAN & BROTHERS, of Glasgow, under date of the 10th inst., report the number of furnaces in blast in Scotland as 119, against 122 a year ago. The quantity of pig iron in CONNAL & CO.'s stores was 69,930, an increase of 540 tons over the week previous. The stock, March 10, 1875, was 28,103 tons. Shipments from December 25, show a falling off of 16,735 tons, as compared with the corresponding time in 1874-5. They quote No. 1 pig iron as follows: Gartsherrie, 69/; Coltness, 72/; Summerlee, 69/: Glengarnock, 66/ 6d.; and Eglinton, 59/.

Rails.—There are rumors of some sales of iron rails for Western and Southern delivery, the particulars of which we were unable to learn. It is now contradicted that the Erie Railway Company has contracted with the Cambria and Scranton mills for 25 000 tons of steel rails, but it is still believed that such contracts will be made. We quote steel rails, at the mills, at $62@$64, and iron at $40@$43.

Old Rails.—Several buyers have been in the market, and by making inquiries through a number of brokers in both this city and Philadelphia, have created the impression that considerable quantities are wanted, which has resulted in an advance in price from what ruled a few weeks ago. We quote nominally at $22.50@$23, without change.

Scrap.—We are reported sales by an Eastern house, aggregating about 1,000 tons. We quote nominally at $31@$32.

Philadelphia Iron Trade.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & CO., Iron Merchants, 333 Walnut street, Philadelphia. Week ending March 23, 1876.

The tone of the iron market is rather better than at our last, though there is nothing doing in the way of large sales. The foundries and mills are fairly busy on orders; in fact some machine shops in this city have more orders and more inquiries than they have had for two years. One large shop started this week that had been idle for over two years. This all looks like more demand for iron, but in these times of one week of good and three of bad trade, we do not feel sure of orders until the iron is shipped and about half used up. We report sales of about 1,000 tons No 1 at $2 and gray forge at quotations. We quote No. 1, $23 to $23 50; No. 2, $21 to $21 50; gray forge, $20 50 to $22 50.

BAR IRON.—There is a little more doing than at our last. but at no more satisfactory price. There are some inquiries for large lots of bars, but at very low prices. We quote $2 35 to 2.5-10.

RAILS.—New iron rails are very dull of sale, while steel rails are in demand at better prices. We quote iron rails $40 to $46; steel rails $67 to $69.

SCRAP.—There is nothing to report. The market has been quiet since our last. We quote $28 to $30.

Baltimore. March 21, 1876.

Specially reported by Messrs R. C. HOFFMAN & CO.

There has been no change in the iron market since our last report. Sales light at quotations.

Baltimore Charcoal	$32@35	Anthracite No. 3	$20@21
Virginia Charcoal	28@34	Mottled and White	17@19
Anthracite No. 1	23@24	Charcoal C B.Blooms 6s@6/ 50	
" No. 2	22@23	Refined Blooms	6.@62 50

Boston. March 18, 1876.

PIG seems to improve slightly at shipping points, that is, in its tone. Quotations have not been advanced, but there is less pressure to sell, with a little more inquiry from consuming buyers. The sale of 300 tons No. 1 Reading, at Philadelphia, f. o. b., at $22.50, an outside brand, is suggestive of this fact. The leading brands of Allentown, Crane, and Thomas are having a little more business, particularly in their No. 2. We quote New York deliveries No. 1, $23; No. 2, $21; and gray forge $20. Here and there a consumer says $19 will buy, but no sales have been reported under $20. All this encourages the Boston market, and the jobbing business, although not increased, seems to progress with more courage.

BAR, although no weaker, has settled to $49 for guaranteed refined, a loss of 25c. plump for the week. One or two cash lots have been done at 50c. better prices, but from the shape of the bill there was a cover that, in

reality, established 1849. The opinion of buyers may be gathered from the fact that an order for 90 tons regular and 10 tons extra, in all 100 tons, went the rounds without being taken. This may be comforting in the suggestion that there is a bottom to the market. Western manufacturers and New York jobbers continue their shower of postals seeking to know why Boston continues this business. The uniform answer must be that it pays. The hieroglyphics over the cost to produce that are put in here, although pointing at $50, continue in the same ratio of inconsistency that was figured when our market was quoting $56 and $58. Boston sells guaranteed refined iron, and lots of it, at her prices; how long it will continue may be a question, but buyers need to know where prices are lowest.

The inquiry for railroad iron is small. Sales of about 500 tons steel rails are reported to have been made to the Boston and Providence road within the past ten days at $58; but the lowest offers just now are $60. This is a pleasant contemplation for the Boston and Lowell, who are understood to be receiving their 6,500-ton contract at $71, a probable difference of $70,000 on the trade between the two values. Iron rails are dull at $48. An offer of 600 tons old Northern wheels delivered in Boston at $21 has been made, but the best that could be done was to take them and remake at $17, which would make such new wheels $38. It might be opportune here rather than in the old iron market to state that old rails, which a week ago were asking in New York $20 f. o. b., that market quotes $23.50 very stiff. Buyers, however, only concede to $21, hence business is at a stand.—*Commercial Bulletin.*

Chattanooga, Tenn. March 21, 1876.

Specially reported by J. F. JAMES, pig iron broker, etc., 233 Market Street.

The market here remains in the same unsettled condition as at the date of our last report. Standard qualities of mill iron are in better demand, and some few fair sales have been made. The outlook is more favorable.

I quote on 4 months' time.

Tenn. Ala. and Ga. Charcoal, No. 1 foundry	$22	@23
" " " No. 2 foundry	20	@ 21
" " " gray forge	18	@ 20
" and Georgia coke, No. 1 foundry	19	@ 20
" " " No. 2 foundry	18	@ 19
" " " gray forge	16	@ 17
White and Mottled	15	@ —
Tennessee and Georgia cold-blast car wheel	26	@ 27
Alabama " "	25	@ 26

Chicago. March 20, 1876.

Specially reported by Messrs. ROGERS & Co., dealers in

The following are the present quotation for pig metal in our market:

Scotch and American pig iron.

No. 1 Coltness	$38 00	@ ....
No. 1 Gartsherrie	38 00	@ ....
No. 1 Summerlee	37 00	@ ....
No. 1 Glengarnock	36 00	@ ....
No. 1 Eglinton	35 00	@ ....
Warner's "American Scotch"	30 00	@ ....
Massilon No. 1 Foundry	29 00	@ ....
No. 1 Grand Tower Mo. ores (Bituminous)	29 00	@ ....
No. 2, " " "	28 00	@ ....
No. 1 Mill	25 00	@ ....
No. 1 Foundry, Ohio	28 00	@ ....
No. 2 " "	27 00	@ ....
No. 1 Hanging Rock (charcoal)	28 00	@ ....
No. 2 " "	26 00	@ ....
Union "A" 1 (Anthracite)	28 00	@ ....
Union "B" 1 (Anthracite)	26 00	@ ....
No. 1 Lake Superior (charcoal)	28 00	@ ....
No. 2 Lake Superior "	26 00	@ ....
No. 3 Lake Superior "	26 00	@ ....
No. 4 Lake Superior "	28 00	@ ....
Bessemer Steel Rails	65 00	@ ....
New Iron Rails	45 00	@ ....
Old Rails	28 00	@ ....

Louisville. March 21, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

Since last report our market has been a little more active for mill grades, and iron suitable for steel purposes, although quotations remain unchanged. There is a fair demand for standard mill irons, and holders of choice brands are not disposed to make concessions. All grades of foundry are dull and unchanged.

The usual time, four mos., is allowed on the quotations below:

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$25 00	@26 00
No. 2 " " "	23 00	@24 00
No. 1, Mill, from " "	—	@ —
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	23 00	@24 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	22 00	@23 00
No. 1, Mill, from " " " " "	21 00	@22 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	23 00	@24 00
No. 2, " " " "	22 00	@23 00
No. 1, Mill, " " " "	21 00	@22 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores	23 00	@24 00
No. 2, " " " "	22 00	@23 00
No. 1, Mill, " " "	21 00	@22 00
No. 1 Foundry, from Missouri Ores	24 00	@25 00
No. 2 " " "	24 00	@25 00
No. 1 Mill, from Missouri Ores	25 00	@26 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00	@40 00
" " Tennessee "	28 00	@30 00
" " Alabama and Georgia Ores	28 00	@38 00
" " Kentucky Ores	28 00	@40 00

Milwaukee. March 20, 1876.

In pig iron sales have been larger, but at less prices on Frankfort and Bay View.

per ton of 2,240 lb.

Frankfort L. S. Charcoal, No. 1	$28	00
" " " No. 2	27	00
" " " No. 3, 4 & 5	25	00
" " " No. 6	25	00
Mil. Anthracite L. S., No. 1	27	00
" " " No. 2	26	00
Wisconsin Iron, No. 1	25	00
Mahoning Valley Bit's No. 1	30	00
" " " No. 2	28	00

Pittsburgh, Pa. March 21, 1876.

Specially reported by A. H. CHILDS, Esq.

The metal market is very dull and prices weaker.

No. 1. foundry	$24 50@25 00	—4 mos
" 2. "	23 00@24 00	—4 mos
Gray forge	21 50@23 00	—4 mos
White and mottled	19 00@21 00	—4 mos
Warm blast charcoal	22 00@26 00	—4 mos
Cold blast " Western	40 00@50 00	—4 mos

Richmond, Va. March 20, 1876.

Reported by ASA SNYDER, Esq.

About 200 tons have been sold since last report. Sales and receipts continue light. There is no disposition on the part of furnaces to make concessions. The quotations of the past week are fully maintained.

Virginia Cold Blast Charcoal Pig Iron					$27 to $33
" Warm " "			"	"	24 to 28
" " " Coke			"	" 1 X	23 to 24
" " " "			"	" 2 X	21 to 22
" " " "			"	" 3	20 to 21
" Anthracite 1 X					24 to 25
" " 2 X					22 to 23
" " 3					21 to 22

San Francisco, Cal.

From the *Commercial Herald*, March 9, 1876. The ship *Candida*, from Ardrossan, brought 550 tons Pig Iron, and the *Golden Gate*, from Liverpool, 220 tons same, also 12,000 bxs Tin Plate and other goods in the line. There has thus far in March been rather an improved demand for Pig Iron, thus enabling holders of No. 1 Glengarnock to obtain $31@32 per ton for same. However, our stocks are too large and burdensome to admit of any extensive business in the line. Sales of Sydney Pig Tin are reported at 21½c.

St. Louis. March 21, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

A much better feeling is manifested by our iron men since our last report. Demand is good, but prices rule very low.

We quote on four months' time:

Mo. Stone Coal No. 1 Fy.	$25 50	Massillon iron, A No. 1	32@—
" " " 2 "	25 50	" " B " 1	31@—
" Gray Mill,	24@25	" " " 2	28@—
" Charcoal No. 1, Fdy.	24 50	Cold Bl. Car Wheel, Mo.	30@33
" " " 2, "	24 50	" " " " Tenn.	30@33
" " Gray Mill,	23@24	" " " " Ala.	30@33
Tenn. " No. 1, Fdy	24@—	" " " " H. R.	33@35
" " " 2, "	22@—	Mo. Charcoal Blooms	60@70
" " Gray Mill	22@—	" Scrap "	55@60
Va. Coke, No. 1, Fdy.	25@—	" " hammered Billets	75@80
" " " 2, "	23@—	Assorted Bar Iron	2 35, 90days
" "Gray Mill,	23@—	No. 1 Wrought Scrap	10 ch.
H. R. Char. No. 1, Fdy.	26@—	Heavy cast "	95 "
" " " 2, "	24@—	Light "	60 "
" " Gray Mill,	24@25		

Montreal. March 14, 1876.

We continue to quote: Pig iron Eglinton and Clyde $21.00@21.50; Carnbroe $21 50@22; American $24@26; Summerlee and Calder $22.00@23.00; Langloan and Gartsherrie $22.00@22.00; Coltness $22.50@23.50; Hematite $30.00@31.00. Bar, per 100 lb., Scotch and Staffordshire, $2.25@2.30; best do., $2.50@2.60. Swedes and Norway $5.00@5.50; Lowmoor and Bowling, $6.50@7.00.—*Monetary Times.*

Prices Paid for Silver Ores at Western Reduction Works.

GEORGETOWN, COLORADO.

Yield of ore in silver.	Price per oz. silver, on basis of 25 per cent. lead.	Yield of ore in silver.	Price per oz. silver, on basis of 25 per cent. lead.
oz.	cents.	oz.	cents.
50	28	200	86
60	37	250	89
70	48	300	92
80	55	350	94
90	60	400	96
100	65	450	98
110	69	500	100
120	72	600	101
130	75	700	102
140	77	800	103
150	79	900	104
175	82	1000	105

* $1.00 paid for each per cent. over 25 per cent. lead.
* $1.50 paid for each per cent. of copper.
* Mill charges $4.00 per ton. Small lots $2.00

SALT LAKE CITY.—Ferruginous lead ores, $1.15 per oz. Ag, on a basis of 25 to 30 per cent. Pb. according to amount of silver in ore, under 30 oz., the basis would be 30 per cent. Pb. Siliceous ores, $1.00 to $1.05, oz. Ag., on a basis of 35 to 50 per cent. Pb. This varies according to the amount of sulphur in the ore, and whether roasting is required. 2 per cent. of silica to be taken up by iron.

METALS.

NEW YORK, FRIDAY EVENING, March 24, 1876.

There is a little better feeling in the metal trade, although business in most articles shows no particular improvement, and is confined to a jobbing trade.

ERNEST W. S. MURRANT, Esq., of London, under date of the 10th inst., says: "There would appear to be a sort of lull in the metal market just now, and for the moment prices have ceased to fall the usual £ per ton per day."

Gold Coin.—During the week under review gold has ranged from 113⅞ to 114⅛ and closed, to-day, at 114¼.

Bullion.—Undoubtedly the most serious question of the mining and financial world to-day is as to the future of silver. The present quotations of $1 14@$1 14⅛ here; of 12 per cent. discount in San Francisco, and 52½d. in London (by cable to-day) show considerable reductions from those of last week. This question is attracting the most serious consideration of the whole civilized world, and it is one to which no practical remedy has yet been suggested. We shall speak of it editorially at greater length in our next. Fine gold bar is quoted at par ($20 67, gold, per ounce) to ¼ per cent. premium in this market; par in San Francisco; and, as per cable quotations of to-day, 84/7½d. in London. These quotations are unchanged from a week ago.

Copper.—There has been more inquiry for ingot copper during the week under review, and prices are much firmer with a rising tendency. Heretofore, during the winter, there has been a sufficient amount of copper arriving overland to supply the requirements of the trade, but now these receipts are decreasing, while there is an increased demand from manufacturers. Manufacturers are said to have but light stocks of ingot, with but little contracted for, and it is also said that there is not much with any of the dealers excepting those who hold the bulk of the copper for higher prices, and some are said to have sold short. The prices realized during the week have ranged from 22c.@22⅞c., the market closing with 22¾c. bid, and 22⅞c. asked.

Mr. MURRANT says of copper: "Chili has recovered nearly a £ from the lowest, and pending the result of the sale of Australian on the 28th inst., prices may go still better. The position of the article is unchanged, and speculators decline to come in at present. At the Swansea ticketing of ore on the 7th inst., about 260 tons in fine, average produce 25 15/16ths per cent. brought an average price of 15/ 5¼d. per unit. The authorized metal report for the week comprises some moderate sales at £75 10/ to £76 for cash."

Tin.—According to to-day's cable advices Straits have fallen to £72, a decline of £1 to £1 10/ from a week ago. The Singapore quotation to-day is $21¾ per picul, an advance of ⅛ over the price of a week ago. Straits, in large lots, is quoted at 16¾c. and in small lots at 17c. L. & F. is in only small supply and quoted at 16¾c. There is but about two tons of Refined English in this market, and it is nominally quoted at 17¼c. Banca, which is also in small supply, is quoted at 21¾c.—prices all gold. The business doing is almost entirely confined to small lots, yet aggregates considerable.

Mr. MURRANT says of tin: "Although the price of foreign sorts is below 72/ for forward delivery; 'spot' parcels have continued to fetch this price, and even up to 73/ 6d. has been reported as paid, the nearest closing price last night was 72/ for Straits, one 'pot' at which there were sellers at the close. The Committee's report of the week is a small business only, at 71/ 6d. to 73/ 6d. for cash and extended prompt."

Tin Plates are in very good jobbing demand, at the following quotations: charcoal tins. $7.50@$7.62½, and ternes, $6.75@$7.25; coke tins, $6.37½@$6.50, and ternes, $6.12½@$6.25.

Lead.—The firm holding the bulk of stock continues to quote firm at 6½c. gold, for ordinary domestic, but the very small demand is being supplied at a fraction under this quotation. At St. Louis ordinary is quoted at 6⅛@6¾c. currency, and soft at about 7c. Foreign, with nothing doing, is nominal at 6¾c.

Spelter and Zinc.—Domestic spelter continues unchanged at 7¾c. currency, although certain dealers by dividing commissions, are doing a little business at a less price. Foreign is nominal at 7⅛c. gold, for W. H. Sheet zinc is quiet at 8¾@8⅞c. gold.

Antimony.—According to cable advices, yesterday, the London price had advanced to £65 and prices in this market show considerable firmness at 16c @ 16½ c., gold.

Quicksilver.—The price in this city is 64c., gold, per pound, and in San Francisco 59c. In London the price per flask is £10.

The San Francisco *Commercial Herald* of March 9, says of Quicksilver: "The prevailing storm and heavy rains throughout the State have greatly interrupted the bringing of supplies to market, yet for all that the supply has been equal to the demand and prices at all times in buyers' favor, say 57½@60c."

FINANCIAL.

New York Stocks.

FRIDAY, March 24, 1876.

The stock dealings in this market during the past week have been without special feature, the aggregate sales amounting to about 4,400 shares with fluctuations confined to narrow limits, the market generally closing at a fractional decline.

Bonds have been dealt in to the extent of some $68,000, without any change worthy of note in the quotations.

Union Mining Company's stock has changed hands to the extent of 2,500 shares, closing at $1.38 per share, be-

ing an advance of 50c. per share from the lowest price of the week.

Mariposa Land and Mining Company.—This stock has sold to the extent of 650 shares during the week, the principal sales having been made at a decline of $2 per share from the highest quotation recorded in our last. The bonds of this company exhibit a slight advance with sales amounting to $10,000 for the week, closing at 101¾.

Spurr Mountain Iron Company coupons are due during the present month.

New York and Allegheny Oil Company has declared a dividend of 5 per cent., payable April 10th.

Chesapeake and Ohio RR.—The bonds of this company are quiet and unchanged. General WICKHAM, the present receiver of the company, stated recently, that a Western connection of the road would be made during the present year, via Ironton and Portsmouth. The Scioto Valley Railroad, now under construction, would form a prominent part in this arrangement, and at once become an important thoroughfare.

The Coal, Iron, and Oil Company of Allegheny Co., Md.—This company owns about five hundred acres of coal-lands, adjoining the lands of the Consolidation, Cumberland Coal and Iron, and New Central Companies. It is said that a large proportion of the coal is of the Big vein. The company propose very soon, probably this spring, to mine the coal themselves, or sell or lease the lands to other parties.

Quotations and Sales of Stocks and Bonds,

For the week ending March 24, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	270	8
Consolidation Coal Co	42⅛	41½	41½	525
Spring Mt. Coal Co	—	—	64¾	100
American Coal Co	—	—	*53	—
Maryland Coal Co	—	—	18½	—
Del., Lack., and West. RR. Co	120	119	119⅜	1450
New Jersey Central RR. Co	107¼	106¾	107⅛	931
Delaware and Hudson Canal Co	120	119¾	119⅞	225
Quicksilver Mining Co. pref'd	—	—	22	—
" " " Common	18¾	18¼	18⅜	200
Mariposa Land & Min. Co. various	9⅛	8	8	650
St. Louis & Iron Mountain RR	25	24⅛	24½	300
Lehigh & Wilkes-Barre Coal Co	—	—	*40	—
Total Shares sold				4399
Sale for the week previous				8295
Decrease				3896

* These are nominal quotations.

BONDS.

	Sales.		Price
Ches. & O. R. R. 6s, 1st. con. on	—	.....	— @ 35⅜
" " " ex coupon	—	.....	— @ 32
Central RR. of N. J. 1st Mtg. N.	1,000	.....	— @114½
" " " 1st Cons	17 000	.....	111½@112
" " " Convt.	10,000	.....	— @110
Del. and H. Canal, 1st Mtg. 94'	—	.....	— @113¾
" " 78, '84	—	.....	— @110
" " Reg. '94	3,000	.....	— @116
Del., Lack. & W. R. R., 7s, conv.	—	.....	@ —
" " " " 2d Mtg.	—	.....	— @116
St. Louis & Iron Mount'n 1st Mtg	2,000	.....	— @102
St. Louis & Iron M'tn. 2d Mtg.	—	.....	— @ 75
Lehigh & Wilkes-Barre Cons	35,000	.....	96⅝@ 96⅞
Total Sales	$68,000		

Closing quotations, in the absence of sales, represent the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, March 24, 1876.

The operations at the Philadelphia Stock Market during the period under review, have been tame, and without feature. The transactions for the week have amounted to some 50,000 shares, which is a decrease of about 35,000 shares from that reported in our last.

Susquehanna Coal Co's. Stock sold on the board to the amount of 50 shares, at 8¼ per share.

Bonds are fairly active, and but slight alterations are noticeable in quotations.

Catawissa RR.—The annual meeting of this company will be held on the 4th of April.

Oil Creek RR. Company.—The increased earnings of this company for the first two months of the present year, compared with those of 1875, amounts to $38,369.

Auction Sales of Stocks and Bonds, during the week, have been as follows:

Hooks Smelting Co. of Philadelphia, 960 shares, par $50, at $60 per share.

Red Bank Mining Co., $2,000 1st Mortgage Bonds, at 30 per cent.

Huntingdon and Broad Top Mt. RR. and Coal Co., $3,000, Consolidated Mtge. Bonds, at 60 per cent.

Susquehanna Canal Co., $5,000, 7 per cent. Mtge. Bonds, 85 per cent.

Quotations and Sales of Stocks and Bonds,

For the week ending March 23, 1876.

STOCKS.

	Highest	Lowest	Closing	Shr's
Lehigh Valley RR. Co	63	62⅞	63	456
Pennsylvania RR.	57	56¼	56½	36250
Reading RR.	51⅝	50¼	50½	9100
Lehigh Coal and Nav. Co	50⅝	50½	50½	3097
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co.	—	—	*10	—
Fulton Coal Co.	—	—	*3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co	—	—	*84	—
St. Nicholas Coal Co.	—	—	*4	—
Cambria Iron Co.	17	16⅞	17	566
Crane Iron Co.	—	—	*46	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	—	—	76½	10
Total shares sold				49,479
Sales for the week previous				84,710
Decrease				35,231

* These quotations are nominal.

BONDS.

	Sales.		Price
H. and B. T. RR. 1st mortgage, 7s	—	.....	— @112
" " " 2d "	—	.....	— @104
" " " 3d " cons	1,000	.....	— @ 60
Lehigh Valley RR. Con. mtg. 6s, Reg	41,000	.....	@ 103¾
" " 7s, 1910	13,000	.....	@111¼
" " 6s Reg. and Con	7,000	.....	106¼@107½
Pennsylvania RR., 1st mtge. 6s	15 000	.....	104¾@105
" gen. " con. 1910	—	.....	— @104½
" " gen. " 6s, reg	1,000	.....	— @108
" " Cons. M. 6s con	16,000	.....	99½@100
Phil. & Reading RR. 7s 93	—	.....	— @114
" " G. M. 7s, con	—	.....	— @103¾
" " " " Deb. 6s	—	.....	— @ 82
" " new convertible 7s	5,500	.....	104½@105
Phil. & Reading C. & I. Co. Deb. 7s	14,000	.....	81 @ 82
" " Various tracts	9,500	.....	89 @ 93
Lehigh Coal & Nav. Co., 6s '84	16,000	.....	104½@105
" " " RR., '97	—	.....	— @104
" " " Con m. 7s	—	.....	— @104
" " " Convt. gold, '97	6,500	.....	105½@106
Penn. Canal, 6s	—	.....	— @ 70
Penn. and N. Y. Canal, 7s	—	.....	— @110
Ches. and Del. Canal, 6s	—	.....	— @ 86
Susquehanna Canal, 6s	—	.....	— @ 77
Delaware Division Canal, 6s	10,000	.....	@ 99¾
Susquehanna Coal Co. 7s	—	.....	— @ 85
Buck. Mount Coal Co. 6s	—	.....	— @ 97½
Penn. Gas Coal Co. 6s	—	.....	— @100¼
Total amount of sales	$155,500		

Closing quotations, in the absence of sales, represent the latest prices bid.

Gold and Silver Stocks.

NEW YORK, March 24, 1876.

The mining share market, with but few exceptions, exhibits an advance. The Consolidated Virginia, Yellow Jacket, and Caledonia Mining Companies have increased their share capital five for one. This places Consolidated Virginia on the same basis as the California Company as regards its number of shares. We note but a difference of $1 per share in the quotations of these companies, and a slight decline in both compared with quotations in our last, it is reported that some trouble exists with the progress of the joint C. & C. shaft on account of the appearance of water, this shaft had attained, at last advices, a depth of 1,111 feet and the drift in the same was 495 feet long.

The main east drift on the 1500-ft level, of the Consolidated Virginia Mine, running to connect with the C. & C. shaft, is making steady progress. The diamond drills are kept from 100 to 200 feet steadily in advance of the face of the drift to prevent the tapping of a flood of water, should a strong flow at any time be encountered. The new assay office is completed and in full blast. A test run was made one day during the week, when $280,000 worth of bullion was melted, assayed, run into bars, stamped and shipped with the most perfect ease. This, without pressing matters in the least, would give a monthly capacity of $8,400,000 and is without doubt the best arranged and largest private assay office in the world.

Yellow Jacket.—The share capital of this company now amounts to 120,000 shares, this stock has made a notable advance during the week, compared with the value of the mine on the old stock basis as recorded in our last, the total value of the same has increased $1,560,000.

Caledonia Mining Company now has a capital of 100,000 shares. The new stock is quoted at $15 per share, this is equal to $1,500,000, as the market value of the mine or an increase of $180,000 compared with the quotation in our last, on the old stock basis.

Ophir.—The ore breasts of this mine, are both looking and yielding well. The north prospects, in the east drift, on the 1600-foot level, are showing more favorable as the drift advances toward the east. The upraise from the 1300-foot level to connect with the east drift on the 1100-foot level, is still disclosing good ore. The east drift, on the 1100-foot level, is steadily advancing, the face in low grade ore. Cleaning out and repairing the east shaft, below the 1465-foot level, is going steadily ahead. It will not be long before the shaft will again be in good working order down to the 1700-foot level.

Hale and Norcross.—A great deal of difficulty exists in this mine in consequence of the flow of water from the Savage mine. A special meeting of the Company is called for during next month to decide upon a proposition to increase the capital stock from $3,200,000 to $11,000,000, divided into 112,000 shares. A recent number of the San Francisco *Commercial Herald* says: "The stock of the Chollar-Potosi has advanced considerably, no doubt due to the absorption of this company and the division of the ground into two companies named respectively Chollar and Potosi. The Hale & Norcross Co. is to share in this division. Two hundred feet are to be sold to the Hale & Norcross, and the Chollar and the Potosi are to receive one-third of the increased shares of the Hale & Norcross, and are to pay one-third of the assessed value of the hoisting works erected on the Hale & Norcross ground.

Overman.—The pumps in this mine are hardly able to hold the water in check, and if the heavy flow continues at the present rate the erection of new and more powerful pumping machinery will be necessary beyond a doubt.

Eureka Consolidated.—This company has levied an assessment of $1 per share, delinquent April 5th.

The St. Patrick Gold Mining Company has declared a dividend of 30 cents per share, amounting to $6,000, payable on the 10th inst. This is a California claim, which has cost stockholders $160,000 in assessments, and this is the first dividend.

The San Francisco Board is a very prosperous institution. It has just commenced the payment of monthly dividends to its one hundred members at the rate of $200 each. It has already a building fund of $200,000, besides the building lot, for which it paid $150,000. Its income is stated to be $30,000 per month. Seats in this Board have been sold at $30,000, and recently $35,000 was refused.

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	Mar. 16.	March 23.
Sierra Nevada	3,300	100,000	$24	$24
Union Consol'd	600	100,000	15	18
Mexican	600	108,000	34	37
Ophir	675	108,000	64	65
California	620	540.000	89	87
Consol'd. Virginia	710	540,000	435	†36
Best & Belcher	540	100,800	59	58
Gould & Curry	612	108,000	21	21
Savage	771	112,000	19	18
Hale & Norcross	400	16,000	65	66
Chollar Potosi	1,400	28,000	127	122
Alpha Consol'd	306	30,000	43	52
Imperial	184	100,000	13	16
Yellow Jacket	57	120,000	115	†36
Kentuck	95	30,000	17	20
Crown Point	541	100,000	24	25
Belcher	1,040	104,000	33	35
Overman	1,200	38,400	80	83
Caledonia	2,188	100.000	66	†15
Justice	2,100	105,000	26	26
Raymond & Ely	5,000	30,000	17	17
Meadow Valley	....	60,000	3	3
Eureka Consolid	....	50,000	11	11
Eureka G. V.	1,680	20,000	3	3
Silver Hill	5,400	54,000	9	9
Julia	3,000	110,000	16	16

† These companies have increased their share capital to five for one of old stock.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, March 23, 1876.

The market shows no activity in copper stocks, although prices, as a general rule, are firm, and any disposition to purchase any line of them would advance rates materially. Allouez is apparently strong at 18, but there does not seem to be any disposition to buy it, outside of the clique who are supposed to hold most all the stock. Calumet is steady. Copper Falls is 4 bid, with little stock offering. There has been an assessment levied on Petherick of 50c. per share, payable May 1, to stockholders of record April 1. Pewabic is a little weaker at 5¼ asked. Quincy steady at 40 bid. Ridge $5 bid. Nothing in small copper.

At the meeting of the Pewabic Mining Company, held yesterday, it was voted that a statement of the mine be printed and sent to each stockholder, and the meeting adjourned for one month, the directors holding over until said time.

At the annual meeting of the Phœnix Copper Company, held March 20, the following were elected directors: Silas Peirce, William E. Coffin, James E. Dupee, William G. Hunt, of Boston, F. G. White, of Michigan, J. H. Tuttle, Texas. Receipts for 1875, $338,492. Expenses, $284,677. Net profit, $53,815, which added to the surplus at the beginning of the year $84,099.

Quincy Mining Company.—We present below an abstract of the operations of this company for the year 1875, as submitted to the stockholders at their annual meeting in New York on the 1st. inst. Also a comparison of the same with their business for 1874:

	1874.	1875.
Shipments for the season	3,626,350lb.	3,409.395lb.
Yield per cent.	84	82
Total of ingot copper	3,050,564lb.	3,798,281lb.
Total product for the year	3,621,405	3 527,315
Product in tons	about 1,811	1764
Of this stamp copper	3,505,530	3,435,395
Mass copper	115,875	91,920
Value of product	$655,092 61	$652,397 86
From sales of silver	990 55	770 22
Total value	656,083 16	652,168 08
Running expenses at mine	379,475 93	371,564 02
Building and construction	11,598 63	15,251 43
Other expenses	70,013 98	70,001 21
Total expenses	461,008 54	456,816 66
Actual mining profit	194,994 62	196,351 42
Received for interest on loans	4,432 20	6,716 30
Sales of real estate at Hancock	3,865 09	9,574 09
Total net income for the year	203,291 91	216 964 79
The assets Jan. 1, 1875, were.		$488,044 35
Net earnings in 1875		216 964 79
		$705,009 14
Dividends paid.		
February 15, 1875, $8 per share	$160,000	
August 1, 1875, $3 per share.	60,000	220,000 00
Assets Jan. 1, 1876,		$485,009 14

Out of which a dividend of $5 per share ($100,000) was paid Feb. 15th.

Calumet and Hecla.—The February product of this mine amounted to nearly 1,126 tons.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20.000	$18 00	$19 00
Calumet and Hecla	20	80,000	169 00	169 50
Central	25	20,000	30 00	30 50
Copper Falls	25	20,000	4 00	4 25
Dana	25	20,000	10	15
Franklin	25	20,000	13 50	14 00
Humboldt	25	20.000	15	18
Madison	25	20,000	18	20
Mesnard	25	20,000	56	60
Minnesota	25	20,000	2 00	2 37½
National	15	20,000	2 25	2 50
Osceola			18	20

Petherick	25	20,000	15 00	20 00
Pewabic	25	20,000	5 25	5 50
Phenix	25	20,000		
Quincy	25	20,000	40 00	40 25
Ridge	25	20,000	5 00	5 12½
Rockland	25	20,000	37	37½
International Silver	—	—	18	20
Star	25	20,000	20	25
Superior	25	20,000	12	15
Eastern RR				

Gas Stocks.

NEW YORK, March 24, 1876.

Gas stocks are dull and without animation, and we make but few changes in our quotations.

Sales of Gas Stocks.—We note sales of gas stocks during the week as follows:

Jamaica Plains, Mass., 20 shares at 113¼.

Citizens of Wakefield, Mass., 13 shares at 91.

Cambridge, Mass., Gas Co., 2 shares at 131½.

Boston Gas Co., small transactions at 790 per share.

Brookline, Mass., Gas Co., 10 shares at auction at 116.

San Francisco Gas Co., 100 shares at from 99 to par.

Montreal Gas Co., about 700 shares at from 160 to 156¾ ex-dividends.

Dividends.—We annex the amount of *cash* dividends paid during the past year, by each of the New York and Brooklyn gas companies.

	Per cent.		Per cent.
Mutual, New York	10	Nassau, Brooklyn	8
New York, " "	20	Peoples, "	7
Metropolitan " "	10	Metropolitan, "	7
Harlem, " "	8	Williamsb'gh, "	12
Manhattan, " "	35	Citizens, "	15*
Brooklyn, Brooklyn	20		

* We are uncertain as to whether this is the correct amount paid by this company or not; it was not less than 10 per cent. however.

Regulating the Price of Gas.—The Committee on Trade and Manufactures have reported the bill introduced in the New York State Assembly by Mr. PATTEN regulating the price of gas. In effect the bill refuses legal sanction to any contract for selling gas which is proved to be less than 16-candle power. The bill has been amended so as to require, in cities of over 100,000 inhabitants, the price of 16-candle gas shall not be more than $2 per thousand cubic feet. In cities between 40,000 and 100,000 it shall not be more than $2.25; in cities between 10,000 and 40,000 not more than $2.50, and in cities from 5,000 to 10,000 not more than $2.75 and in smaller places not less than $3. While it is fair to suppose that the bill is introduced in good faith, it has in it all the materials for a "strike;" and as the committee added the section regulating the price of gas—which Mr. PATTEN very properly left out—the appearances are that the members of the committee intend to improve their chances on the floor. It will be noticed that the bill is an interference with the right of contract, which could not be enforced if it ought to be and ought not to be if it could. No wise man would vote for it and no honest man can. Fortunately, the bill has not the least chance of passing, and if any gas companies permit themselves to be plundered for its defeat the money they pay will be retained by lobbyists who are powerless to prevent the defeat of the bill.

Mutual Gas Co., N. Y.—This Company has just made contracts to lay 17 miles of pipe. Operations will begin as soon as the frost is out of the ground.

Price of Gas.—We collect, principally from recent issues of this Journal, the following list of Gas Companies (the majority of which have made reduction in the price of gas since the first of January), showing the present rate charged by them per 1,000 cubic feet:

Little Rock, Ark[1]	$5 00	Baltimore, Md.[13]	$3 00
Augusta, Ga.	4 00	Altoona, Pa.	3 00
Bayonne City, N. J.	4 00	Harrisburg, Pa.	3 00
Charlestown, W. Va.	4 00	Reading, Pa.	3 00
Lyons, N. Y.	4 00	Williamsport, Pa.	2 92
Belfast, Me.[2]	4 00	Newark, N. J.	2 85
East Newark, N. J.	4 00	Brooklyn, N. Y. (six	
Meriden, Conn.	3 93	companies), each	2 75
Hagerstown, Md.	3 75	Harlem, N. Y.[14]	2 75
Brockville, Ontario	3 75	Syracuse, N. Y.	2 75
Bloomfield, N. J.	3 75	New Haven, Conn.	2 75
Staten Island, N. Y.[3]	3 75	Hartford, Conn.	2 75
Rome, N. Y.	3 60	Albany, N. Y.	2 75
Camden, N. J.	3 60	Hoboken, N. J.	2 75
Eastchester, N. Y.	3 50	Jersey City, N. J.	2 75
Wilkes-Barre, Pa.[4]	3 50	Zanesville, Ohio	2 70
Charlottesville, Va.[5]	3 50	Poughkeepsie, N Y.,	
Marietta, Ohio[6]	3 50	(Citizens')[15]	2 70
Elkhart, Ind.	3 50	New York City (four	
Guelph, Ontario	3 50	companies), each	2 50
Peoria, Ill.	3 50	New York City (Muni-	
Bath, Me.	3 50	cipal Company)[16]	2 50
Terre Haute, Ind.	3 50	Lowell, Mass.	2 00
Jamaica Plains, Mass.[7]	3 50	Chicago, Ill.	2 50
Pottsville, Pa.[8]	3 50	Trenton, N. J.	2 50
Fredericksburg, Va.	3 40	Washington, D.C.[17]	2 25
Akron, Ohio	3 30	Boston, Mass.[14]	2 25
Utica, N. Y.	3 25	Providence, R. I.	2 25
Laclede, St. Louis, Mo	3 25	Buffalo, N. Y.	2 25
York, Pa.	3 20	St. Louis, Mo.	2 25
Nantucket, Mass.[9]	3 00	Philadelphia, Pa.	2 15
Erie, Pa.[10]	3 00	Sunbury, Pa.	2 00
Knoxville, Tenn.[11]	3 00	Richmond, Va.	2 00
Tiffin, Ohio	3 00	Allegheny City, Pa.	1 80
East New York.[12]	3 00	Cincinnati, Ohio.[18]	1 70
Cumberland, Md.	3 00	Pittsburgh, Pa.	1 00
Elizabeth, N. J.	3 00	Detroit, Mich.[19]	1 00
Springfield, Mass.[13]	3 00		

[1] The gas used here is made from Pittsburgh coal and pine knots. [2] Ten per cent. discount on bills over $10, and five per cent. discount for bills under $10. [3] Five per cent. off for prompt payments. [4] Ten per cent. discount for prompt payment. [5] Rent of meter 20c. per m. [6] 20c. per m. discount for prompt payment, and 30c. additional to this to all persons using 3,000 feet and over. This company charges the city $3 per m. [8] Ten per cent. reduction from bills if paid within 20 days. [9] Rent of meter 15c. per m. [10] This company receives from the city $28 per annum for each lamp. [11] Rent of meter 15c. per m. [12] This company has reduced to this figure in exceptional instances, the general rate charged by them being $4 per m. [13] One-twelfth discount from bills for prompt payments. [14] These rates will go into effect on the 1st of April next. [15] Gwynne-Harris process. [16] This is a water gas manufactured by the Tessié du Motay process. [17] This rate will go into effect on the 1st of May. [18] There is a second gas company in this city which, it is stated, supplies consumers at $1 per m. [19] Naphtha gas.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Dividend.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Jan. '76	110	111
" " Bonds	900,00	1,000	‡3½	Aug. '75	105	
NewYork, "	4,000,000		5	Jan. '76	140	145
Metropol. "	2,500,000	100	5	Sept. '75	140	143
" " Certf.	1,000,000	...	3½	" "	100	103½
" " Bonds	500,000	1,000	3½	July, "	105	
Harlem "	1.850,000	50	4	Feb. '76	120	123
Manhattan "	4,000,000	50	10	Jan. "	260	270
Brooklyn, B'klyn	2,000,000	25	5	Nov. '75	190	195
Nassau "	1,000,000	20	4	July, "	92	95
" " Certf.	700,000	1,000	3¾	Nov. "	95	98
People's "	1,000,000	10	3½	Jan. '76	65	70
" " Certf.	300,000	1,000	3½	July, '75	85	86
" " Bds	325,000	....	3½	Aug. "		95
Metropol. "	1,000,000	10	3½	May, "	65	70
Wmsburgh "	1,000,000	50	5	July, "	120	125
" " Certf.	1,000,000	....	3½	July, "	95	100
Citizen's "	1,200,000	20	2½	Jan. '76	95	100
" " Certf	320,000	1,000	3½	Oct. '75	99	101
J. C. N. J.	386,000	20	5	July, "	140	160
Centl. Westch. N.Y.	466,000	50	4	July, "	100	105

‡ Gold.

Companies out of Town.*	Cap. Stk.	Par	Bid	Askd.
People's " " of J. C.			125	135
¶Citizen's G. L. Co., New'k. N.J.	1,095,000	50		90
Hempstead " " L. I., N.Y.	40,000	100		100
Jamaica, " " " "	25,000	100		100
Richmond Co., S. I. "	300,000		100	105
Citizens', Rochester, "		100	60	68
Rochester Gas Co., "		100	50	
‖People's G. L. Co. Albany,"	1,000,000	100		40
§Mutual " Buffalo "	750,000	100	45	55
Mutual " Detroit Mich.		50	18	
TroyG. L. Co., Troy, N. Y.			108	
Brockport, N. Y., G. L. Co.	25,000	100		80
†Baltimore G. L. Co., Balt.. Md	2,000,000	100	180	185
People's G. L. Co., Balt., Md	2,000,000	25	25	
Hannibal G. L. Co., Hanni., Mo.	100,000	100	95	100
La Clede, St. Louis, Mo	1,200,100	100	114	120
Lewiston G. L. Co., Lewis., Me	400,000	100	33	
Chicago G. L. Co., Chicago, Ill.	2,000,000	100	140	
Jacksonville, Ill.	120,000	100	82	
‡Lima, Ohio.	60 000	100	10	
Derby G. L. Co., Derby, Conn.	160,000	100		80
Woonskt G. L. Co. Woonskt, R.I.	150,000	100	100	
Fort Wayne G. L. Co. F. W., Ind		100	90	100
North. LibertiesG. L. Co. Phila.		25	29	
Wilkes-Barre G. L. Co W. B. Pa.		50	70	
Washington G. L. Co., Phila.			42	43
Pottsville, Pa. Gas Co		50	40¾	
Portland G. L. Co. Portland, Me	350.000	50	72	75
Hartford G. L. Co., Hartford, Ct	700,000	25	41	
Boston G. L. Co., Boston, Mass.	2,500,000	500	790	795
East Boston, Mass		25	132	
Chelsea G. L. Co. Chelsea, "	300,000		139	
Cambridge G. L. Co., Cam., "	700,000		132¾	
Louisville G. L. Co., Louis., Ky.			127	
Cincinnati G. L Co , Cincin, O.				200
St. Louis G. L. Co		50		160
Carondelet G. L. Co., Mo		50		6¾
S. F. G.L. Co. San Francisco, Cal	10,000,000	100	99	100
City G. L. Co. Montreal, Can.	1,440,000	40	a156¾	
Consumers G. L (old.) Tor., Ont	600,000	50	132½	
Hamilton G. L. Co., Ont.	150,000	40	112½	
Halifax G. L. Co., Halifax, N.S.	400 000	40	145	

* These quotations represent the latest obtainable prices at which sales were made.

† This Company has issued $1,000,000 in certificates in addition to their stock indebtedness, on which they pay interest at the rate of 6 per cent. gold.

‡ This Company has $30.000 in bonds outstanding.

§ $ 00,000 represents the bonded indebtedness of this Company; these bonds have recently been offered at 90.

‖ $3 0,000 of the indebtedness of this company is represented by bonds.

¶$124,000 of the indebtedness of this company is represented by bonds; also $53,000 in certificates, which is included in the aggregate stock debt quoted.

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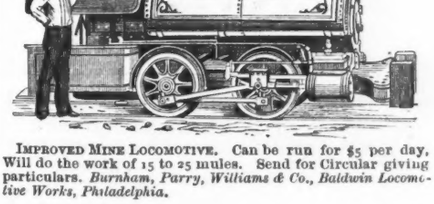

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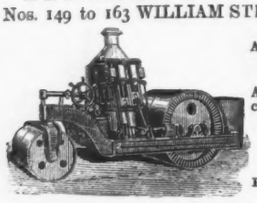

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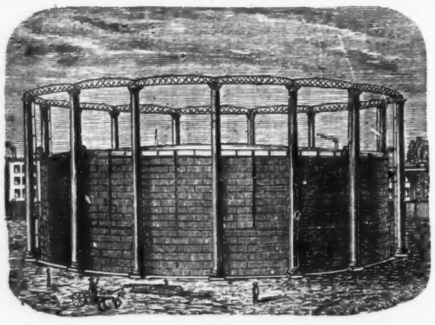

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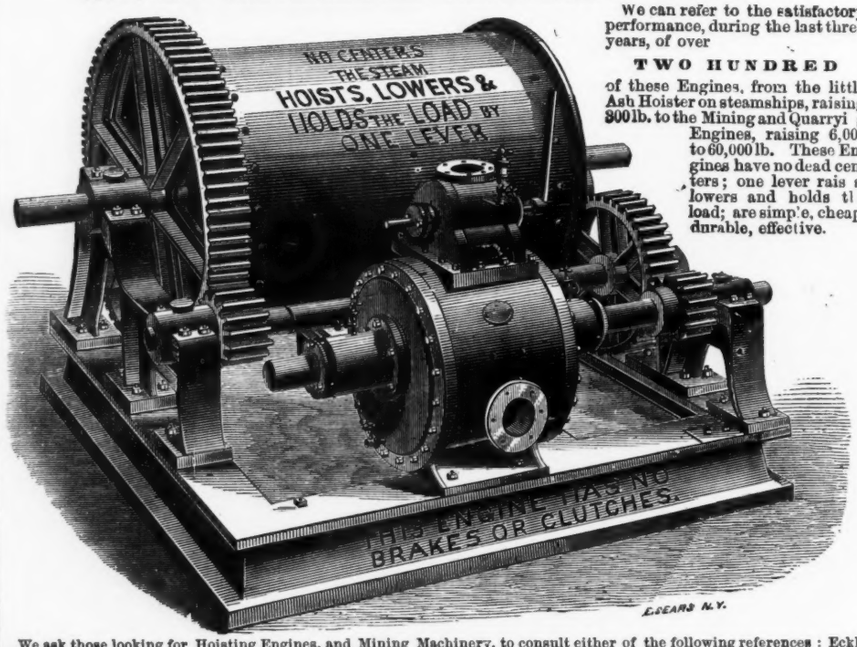

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